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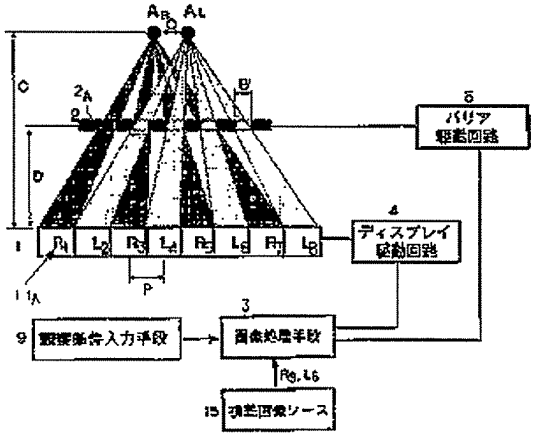
(54)【発明の名称】　立体画像表示方法及びそれを用いた立体画像表示装置

(57)【要約】

【課題】　視差画像のクロストークが少なく、しかもフリッカー及びモアレ縞が生じ難い立体画像表示方法及びそれを用いた立体画像表示装置を得ること。

【解決手段】　視差画像情報を有する視差画像ソースからの複数の視差画像の夫々をストライプ画素に分割し、該複数のストライプ画素の一部を所定の順序で配列して１つのストライプ画像を合成してディスプレイ上に表示し、該ディスプレイの前方又は後方の所定の位置に設けた空間光変調素子上に所定のピッチの光透過部と光遮光部より成る開口パターンを表示し、該空間光変調素子によって該ストライプ画像の左右夫々の眼に対応するストライプ画素を夫々観察者の左右の眼に入射させることにより立体視を得る際、該ディスプレイと該空間光変調素子とを対応して走査する走査線上で１画素毎又は１走査線毎に同期して該ストライプ画像と該開口パターンを表示する。



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【特許請求の範囲】

【請求項１】　視差画像情報を有する視差画像ソースからの複数の視差画像の夫々をストライプ画素に分割し、該複数のストライプ画素の一部を所定の順序で配列して１つのストライプ画像を合成してディスプレイ上に表示し、該ディスプレイの前方又は後方の所定の位置に設けた空間光変調素子上に所定のピッチの光透過部と光遮光部より成る開口パターンを表示し、該空間光変調素子によって該ストライプ画像の左右夫々の眼に対応するストライプ画素を夫々観察者の左右の眼に入射させることにより立体視を得る際、

該ディスプレイと該空間光変調素子とを対応して走査する走査線上で１画素毎又は１走査線毎に同期して該ストライプ画像と該開口パターンを表示することを特徴とする立体画像表示方法。

【請求項２】　前記ディスプレイと前記空間光変調素子とを対応して走査する走査線はインターレース走査を行うことを特徴とする請求項１の立体画像表示方法。

【請求項３】　前記ディスプレイと前記空間光変調素子とを対応して走査する走査線は鉛直方向に走査することを特徴とする請求項１又は２の立体画像表示方法。

【請求項４】　前記複数の視差画像は左右の視差画像であり、前記ストライプ画像は該右の視差画像を分割したストライプ画素のうちの奇数番目のストライプ画素と該左の視差画像を分割したストライプ画素のうちの偶数番目のストライプ画素とを交互に配列して合成した第１のストライプ画像、

或は該右の視差画像を分割した該ストライプ画素のうちの偶数番目のストライプ画素と該左の視差画像を分割した該ストライプ画素のうちの奇数番目のストライプ画素とを交互に配列して合成した第２のストライプ画像であり、

該２つのストライプ画像の１つを該ディスプレイ上に表示した後、続いて他方のストライプ画像を表示し、

その際、前記空間光変調素子上に光透過部と光遮光部とを切り換えた開口パターンを表示することを特徴とする請求項１、２又は３の立体画像表示方法。

【請求項５】　前記ストライプ画像は前記ディスプレイの表示面の一部分に表示し、該表示面の残余の部分には非ストライプ画像を表示し、前記空間光変調素子の表示面中、該ディスプレイに表示する該ストライプ画像に対応する部分には開口パターンを表示し、該空間光変調素子の表示面中の残余の部分を透光状態にすることを特徴とする請求項１～４のいずれか１項に記載の立体画像表示方法。

【請求項６】　前記ストライプ画像は前記ディスプレイの表示面の一部分に表示し、該表示面の残余の部分には非ストライプ画像を表示し、前記空間光変調素子の表示面には全面に開口パターンを表示することを特徴とする請求項１～４のいずれか１項に記載の立体画像表示方法。

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【請求項７】　前記ディスプレイに表示する前記ストライプ画像を構成する各ストライプ画素の表示幅及び／又は前記空間光変調素子に表示する前記開口パターンの光透過部及び光遮光部の表示幅がそれぞれの表示面を構成している画素の複数個の幅であることを特徴とする請求項１～６のいずれか１項に記載の立体画像表示方法。

【請求項８】　前記ディスプレイに表示する前記ストライプ画像を構成する各ストライプ画素の表示幅は該ディスプレイの表示面を構成している画素の一画素の幅であり、前記空間光変調素子に表示する前記開口パターンの光透過部・光遮光部の表示幅は該空間光変調素子の表示面を構成している画素の複数個の幅であることを特徴とする請求項１～６のいずれか１項に記載の立体画像表示方法。

【請求項９】　前記ディスプレイに表示する前記ストライプ画像を構成する各ストライプ画素の表示幅は該ディスプレイの表示面を構成している画素の複数個の幅であり、前記空間光変調素子に表示する前記開口パターンの光透過部及び光遮光部の表示幅は該空間光変調素子の表示面を構成している画素の一画素の幅であることを特徴とする請求項１～６のいずれか１項に記載の立体画像表示方法。

【請求項１０】　前記ディスプレイ及び前記空間光変調素子の各表示面がマトリックス構造の画素を有することを特徴とする請求項１～９のいずれか１項に記載の立体画像表示方法。

【請求項１１】　前記ディスプレイに表示するストライプ画像からは所定の偏光光より成る光を射出していることを特徴とする請求項１～１０のいずれか１項に記載の立体画像表示方法。

【請求項１２】　前記空間光変調素子は液晶素子で構成していることを特徴とする請求項１～１１のいずれか１項に記載の立体画像表示方法。

【請求項１３】　観察者の視点位置を自動的に検出する観察条件検出手段又は観察者が入力する観察条件入力手段からの信号により、前記ストライプ画像の構成要素及び前記開口パターンの構成要素の少なくとも１つを制御することを特徴とする請求項１～１２のいずれか１項に記載の立体画像表示方法。

【請求項１４】　観察者の視点位置を自動的に検出する観察条件検出手段又は観察者が入力する観察条件入力手段からの信号に基づき、前記ディスプレイと前記空間光変調素子との間隔を間隔制御手段により制御することを特徴とする請求項１～１２のいずれか１項に記載の立体画像表示方法。

【請求項１５】　観察者の視点位置を自動的に検出する観察条件検出手段又は観察者が入力する観察条件入力手段からの信号により、前記視差画像情報を構成する３つ以上の原視差画像より前記視差画像を選択して使用する

ことを特徴とする請求項１～１４のいずれか１項に記載の立体画像表示方法。

【請求項１６】　観察者の視点位置を自動的に検出する観察条件検出手段又は観察者が入力する観察条件入力手段からの信号により、前記視差画像情報を構成するデータより前記視差画像を観察者の視点位置に応じて生成する．若しくは該視差画像情報を構成する少なくとも２つの原視差画像より該視差画像を観察者の視点位置に応じて補間又は再構成して作成することを特徴とする請求項１～１４のいずれか１項に記載の立体画像表示方法。

【請求項１７】　前記ディスプレイと前記空間光変調素子とを１画素毎又は１走査線毎に同期して前記ストライプ画像と前記開口パターンを表示する際に、該空間光変調素子上の同期して表示する画素に先行する複数画素又は同期して表示する走査線に先行する複数走査線を遮光部として先行して表示させることを特徴とする請求項１～１６のいずれか１項に記載の立体画像表示方法。

【請求項１８】　前記ディスプレイ及び前記空間光変調素子の表示面を走査線に沿って夫々同じ大きさの複数領域に分割し、該複数の領域から相対的に同じ位置の走査線を同時に選択して走査し．該ディスプレイと該空間光変調素子の上に複数の該走査線上で１画素毎又は複数の該走査線の対応する走査線毎に同期して前記ストライプ画像と前記開口パターンを表示することを特徴とする請求項１～１７のいずれか１項に記載の立体画像表示方法。

【請求項１９】　視差画像情報を有する視差画像ソースからの複数の視差画像の夫々をストライプ画素に分割し．該複数のストライプ画素の一部を所定の順序で配列して合成した１つのストライプ画像をディスプレイ上に表示し、該ディスプレイの前方又は後方の所定の位置に設けた空間光変調素子上に所定のピッチの光透過部と光遮光部より成る開口パターンを表示し．該空間光変調素子によって該ストライプ画像の左右夫々の眼に対応するストライプ画素を夫々観察者の左右の眼に入射させることにより立体視を得る際．

該ディスプレイと該空間光変調素子とを対応して走査する走査線上で１画素毎又は１走査線毎に同期して該ストライプ画像と該開口パターンを表示していることを特徴とする立体画像表示装置。

【請求項２０】　前記ディスプレイと前記空間光変調素子とを対応して走査する走査線はインターレース走査を行っていることを特徴とする請求項１９の立体画像表示装置。

【請求項２１】　前記ディスプレイと前記空間光変調素子とを対応して走査する走査線は鉛直方向に走査していることを特徴とする請求項１９又は２０の立体画像表示装置。

【請求項２２】　前記複数の視差画像は左右の視差画像であり、前記ストライプ画像は該右の視差画像を分割したストライプ画素のうちの奇数番目のストライプ画素と該左の視差画像を分割したストライプ画素のうちの偶数番目のストライプ画素とを交互に配列して合成した第１のストライプ画像、

又は該右の視差画像を分割した該ストライプ画素のうちの偶数番目のストライプ画素と、該左の視差画像を分割した該ストライプ画素のうちの奇数番目のストライプ画素とを交互に配列して合成した第２のストライプ画像であり．

該第１のストライプ画像の表示に際して表示する開口パターンと該第２のストライプ画像の表示に際して表示する開口パターンとは互いに光透過部と光遮光部とが逆の関係にあり、該２つのストライプ画像を連続して表示することを特徴とする請求項１９～２１のいずれか１項に記載の立体画像表示装置。

【請求項２３】　前記ストライプ画像は前記ディスプレイの表示面の一部分に表示し、該表示面の残余の部分には非ストライプ画像を表示し、

前記空間光変調素子の表示面中、該ディスプレイに表示する該ストライプ画像に対応する部分には開口パターンを表示し、該空間光変調素子の表示面中の残余の部分を透光状態にすることを特徴とする請求項１９～２２のいずれか１項に記載の立体画像表示装置。

【請求項２４】　前記ストライプ画像は前記ディスプレイの表示面の一部分に表示し、該表示面の残余の部分には非ストライプ画像を表示し、前記空間光変調素子の表示面には全面に開口パターンを表示することを特徴とする請求項１９～２２のいずれか１項に記載の立体画像表示装置。

【請求項２５】　前記ディスプレイに表示する前記ストライプ画像を構成する各ストライプ画素の表示幅及び／又は前記空間光変調素子に表示する前記開口パターンの光透過部及び光遮光部の表示幅がそれぞれの表示面を構成している画素の複数個の幅であることを特徴とする請求項１９～２４のいずれか１項に記載の立体画像表示装置。

【請求項２６】　前記ディスプレイに表示する前記ストライプ画像を構成する各ストライプ画素の表示幅は該ディスプレイの表示面を構成している画素の一画素の幅であり．前記空間光変調素子に表示する前記開口パターンの光透過部及び光遮光部の表示幅は該空間光変調素子の表示面を構成している画素の複数個の幅であることを特徴とする請求項１９～２４のいずれか１項に記載の立体画像表示装置。

【請求項２７】　前記ディスプレイに表示する前記ストライプ画像を構成する各ストライプ画素の表示幅は該ディスプレイの表示面を構成している画素の複数個の幅であり．前記空間光変調素子に表示する前記開口パターンの光透過部・光遮光部の表示幅は該空間光変調素子の表示面を構成している画素の一画素の幅であることを特徴

ことを特徴とする請求項１～１４のいずれか１項に記載の立体画像表示方法。

【請求項１６】　観察者の視点位置を自動的に検出する観察条件検出手段又は観察者が入力する観察条件入力手段からの信号により、前記視差画像情報を構成するデータより前記視差画像を観察者の視点位置に応じて生成する．若しくは該視差画像情報を構成する少なくとも２つの原視差画像より該視差画像を観察者の視点位置に応じて補間又は再構成して作成することを特徴とする請求項１～１４のいずれか１項に記載の立体画像表示方法。

【請求項１７】　前記ディスプレイと前記空間光変調素子とを１画素毎又は１走査線毎に同期して前記ストライプ画像と前記開口パターンを表示する際に、該空間光変調素子上の同期して表示する画素に先行する複数画素又は同期して表示する走査線に先行する複数走査線を遮光部として先行して表示させることを特徴とする請求項１～１６のいずれか１項に記載の立体画像表示方法。

【請求項１８】　前記ディスプレイ及び前記空間光変調素子の表示面を走査線に沿って夫々同じ大きさの複数領域に分割し、該複数の領域から相対的に同じ位置の走査線を同時に選択して走査し．該ディスプレイと該空間光変調素子の上に複数の該走査線上で１画素毎又は複数の該走査線の対応する走査線毎に同期して前記ストライプ画像と前記開口パターンを表示することを特徴とする請求項１～１７のいずれか１項に記載の立体画像表示方法。

【請求項１９】　視差画像情報を有する視差画像ソースからの複数の視差画像の夫々をストライプ画素に分割し．該複数のストライプ画素の一部を所定の順序で配列して合成した１つのストライプ画像をディスプレイ上に表示し、該ディスプレイの前方又は後方の所定の位置に設けた空間光変調素子上に所定のピッチの光透過部と光遮光部より成る開口パターンを表示し．該空間光変調素子によって該ストライプ画像の左右夫々の眼に対応するストライプ画素を夫々観察者の左右の眼に入射させることにより立体視を得る際．

該ディスプレイと該空間光変調素子とを対応して走査する走査線上で１画素毎又は１走査線毎に同期して該ストライプ画像と該開口パターンを表示していることを特徴とする立体画像表示装置。

【請求項２０】　前記ディスプレイと前記空間光変調素子とを対応して走査する走査線はインターレース走査を行っていることを特徴とする請求項１９の立体画像表示装置。

【請求項２１】　前記ディスプレイと前記空間光変調素子とを対応して走査する走査線は鉛直方向に走査していることを特徴とする請求項１９又は２０の立体画像表示装置。

【請求項２２】　前記複数の視差画像は左右の視差画像であり、前記ストライプ画像は該右の視差画像を分割したストライプ画素のうちの奇数番目のストライプ画素と該左の視差画像を分割したストライプ画素のうちの偶数番目のストライプ画素とを交互に配列して合成した第１のストライプ画像、

又は該右の視差画像を分割した該ストライプ画素のうちの偶数番目のストライプ画素と、該左の視差画像を分割した該ストライプ画素のうちの奇数番目のストライプ画素とを交互に配列して合成した第２のストライプ画像であり．

該第１のストライプ画像の表示に際して表示する開口パターンと該第２のストライプ画像の表示に際して表示する開口パターンとは互いに光透過部と光遮光部とが逆の関係にあり、該２つのストライプ画像を連続して表示することを特徴とする請求項１９～２１のいずれか１項に記載の立体画像表示装置。

【請求項２３】　前記ストライプ画像は前記ディスプレイの表示面の一部分に表示し、該表示面の残余の部分には非ストライプ画像を表示し、

前記空間光変調素子の表示面中、該ディスプレイに表示する該ストライプ画像に対応する部分には開口パターンを表示し、該空間光変調素子の表示面中の残余の部分を透光状態にすることを特徴とする請求項１９～２２のいずれか１項に記載の立体画像表示装置。

【請求項２４】　前記ストライプ画像は前記ディスプレイの表示面の一部分に表示し、該表示面の残余の部分には非ストライプ画像を表示し、前記空間光変調素子の表示面には全面に開口パターンを表示することを特徴とする請求項１９～２２のいずれか１項に記載の立体画像表示装置。

【請求項２５】　前記ディスプレイに表示する前記ストライプ画像を構成する各ストライプ画素の表示幅及び／又は前記空間光変調素子に表示する前記開口パターンの光透過部及び光遮光部の表示幅がそれぞれの表示面を構成している画素の複数個の幅であることを特徴とする請求項１９～２４のいずれか１項に記載の立体画像表示装置。

【請求項２６】　前記ディスプレイに表示する前記ストライプ画像を構成する各ストライプ画素の表示幅は該ディスプレイの表示面を構成している画素の一画素の幅であり．前記空間光変調素子に表示する前記開口パターンの光透過部及び光遮光部の表示幅は該空間光変調素子の表示面を構成している画素の複数個の幅であることを特徴とする請求項１９～２４のいずれか１項に記載の立体画像表示装置。

【請求項２７】　前記ディスプレイに表示する前記ストライプ画像を構成する各ストライプ画素の表示幅は該ディスプレイの表示面を構成している画素の複数個の幅であり．前記空間光変調素子に表示する前記開口パターンの光透過部・光遮光部の表示幅は該空間光変調素子の表示面を構成している画素の一画素の幅であることを特徴

とする請求項１９～２４のいずれか１項に記載の立体画像表示装置。

【請求項２８】　前記ディスプレイ及び前記空間光変調素子の各表示面がマトリックス構造の画素を有することを特徴とする請求項１９～２７のいずれか１項に記載の立体画像表示装置。

【請求項２９】　前記空間光変調素子は液晶素子であることを特徴とする請求項１９～２８の立体画像表示装置。

【請求項３０】　前記空間光変調素子は強誘電性液晶素子であることを特徴とする請求項２９の立体画像表示装置。

【請求項３１】　前記ディスプレイは液晶素子であることを特徴とする請求項２９又は３０の立体画像表示装置。

【請求項３２】　前記ディスプレイは強誘電性液晶素子であることを特徴とする請求項３１の立体画像表示装置。

【請求項３３】　前記ディスプレイを自発光型テレビと１枚の偏光板とで構成していることを特徴とする請求項２９又は３０の立体画像表示装置。

【請求項３４】　前記ディスプレイに表示するストライプ画像からは所定の偏光光より成る光を射出し、前記空間光変調素子を液晶素子と１枚の偏光板で構成していることを特徴とする請求項１９～３３のいずれか１項に記載の立体画像表示装置。

【請求項３５】　観察者の視点位置を自動的に検出する観察条件検出手段又は観察者が入力する観察条件入力手段からの信号により、前記ストライプ画像の構成要素及び前記開口パターンの構成要素の少なくとも１つを制御することを特徴とする請求項１９～３４のいずれか１項に記載の立体画像表示装置。

【請求項３６】　観察者の視点位置を自動的に検出する観察条件検出手段又は観察者が入力する観察条件入力手段からの信号に基づき、前記ディスプレイと前記空間光変調素子との間隔を間隔制御手段により制御することを特徴とする請求項１９～３４のいずれか１項に記載の立体画像表示装置。

【請求項３７】　観察者の視点位置を自動的に検出する観察条件検出手段又は観察者が入力する観察条件入力手段からの信号により、前記視差画像情報を構成する３つ以上の原視差画像より前記視差画像を選択して使用することを特徴とする請求項１９～３６のいずれか１項に記載の立体画像表示装置。

【請求項３８】　観察者の視点位置を自動的に検出する観察条件検出手段又は観察者が入力する観察条件入力手段からの信号により、前記視差画像情報を構成するデータより前記視差画像を観察者の視点位置に応じて生成する．若しくは該視差画像情報を構成する少なくとも２つの原視差画像より該視差画像を観察者の視点位置に応じて補間又は再構成して作成することを特徴とする請求項１９～３６のいずれか１項に記載の立体画像表示装置。

【請求項３９】　前記ディスプレイと前記空間光変調素子とを１画素毎又は１走査線毎に同期して前記ストライプ画像と前記開口パターンを表示する際に、該空間光変調素子上の同期して表示する画素に先行する複数画素又は同期して表示する走査線に先行する複数走査線を遮光部として先行して表示することを特徴とする請求項１９～３８のいずれか１項に記載の立体画像表示装置。

【請求項４０】　前記ディスプレイ及び前記空間光変調素子の表示面を走査線に沿って夫々同じ大きさの複数領域に分割し、該複数の領域から相対的に同じ位置の走査線を同時に選択して走査し．該ディスプレイと該空間光変調素子の上に複数の該走査線上で１画素毎又は複数の該走査線の対応する走査線毎に同期して前記ストライプ画像と前記開口パターンを表示することを特徴とする請求項１９～３９のいずれか１項に記載の立体画像表示装置。

【請求項４１】　視差画像ソースからの左右眼用の視差画像を各々ストライプ画素に分割し．該ストライプ画素を所定の順序で配列して合成した１つのストライプ画像を走査しながら順次形成するディスプレイと、該ディスプレイの前方又は後方に所定のピッチの光透過部と光遮光部より成る開口パターンを該走査に同期させて順次形成する空間光変調素子を配置し、該ディスプレイに表示した該ストライプ画像からの光を該開口パターンによって該ストライプ画像の左右夫々の眼に対応するストライプ画素を夫々観察者の左右の眼に入射させることにより立体視するようにしたことを特徴とする立体画像表示装置。

【請求項４２】　前記ディスプレイの前方に前記空間光変調素子を設け．該空間光変調素子の前方又は該ディスプレイと該空間光変調素子との間に水平方向にのみパワーを有するリニアフレネルレンズを有することを特徴とする請求項１９～４１のいずれか１項に記載の立体画像表示装置。

【請求項４３】　光源手段により照明した空間光変調素子を前記ディスプレイの後方に設け．該ディスプレイの前方又は該ディスプレイと該空間光変調素子との間に水平方向にのみパワーを有するリニアフレネルレンズを有することを特徴とする請求項１９～４１のいずれか１項に記載の立体画像表示装置。

【請求項４４】　視差画像ソースからの左右眼用の視差画像を各々ストライプ画素に分割し．該ストライプ画素を所定の順序で配列して合成した１つのストライプ画像をディスプレイ上に走査しながら順次形成し、該ディスプレイに表示した該ストライプ画像からの光を所定のピッチの光透過部と光遮光部とを該走査に同期させて空間光変調素子上に順次形成した開口パターンによって該ストライプ画像の左右夫々の眼に対応するストライプ画素

とする請求項１９～２４のいずれか１項に記載の立体画像表示装置。

【請求項２８】　前記ディスプレイ及び前記空間光変調素子の各表示面がマトリックス構造の画素を有することを特徴とする請求項１９～２７のいずれか１項に記載の立体画像表示装置。

【請求項２９】　前記空間光変調素子は液晶素子であることを特徴とする請求項１９～２８の立体画像表示装置。

【請求項３０】　前記空間光変調素子は強誘電性液晶素子であることを特徴とする請求項２９の立体画像表示装置。

【請求項３１】　前記ディスプレイは液晶素子であることを特徴とする請求項２９又は３０の立体画像表示装置。

【請求項３２】　前記ディスプレイは強誘電性液晶素子であることを特徴とする請求項３１の立体画像表示装置。

【請求項３３】　前記ディスプレイを自発光型テレビと１枚の偏光板とで構成していることを特徴とする請求項２９又は３０の立体画像表示装置。

【請求項３４】　前記ディスプレイに表示するストライプ画像からは所定の偏光光より成る光を射出し、前記空間光変調素子を液晶素子と１枚の偏光板で構成していることを特徴とする請求項１９～３３のいずれか１項に記載の立体画像表示装置。

【請求項３５】　観察者の視点位置を自動的に検出する観察条件検出手段又は観察者が入力する観察条件入力手段からの信号により、前記ストライプ画像の構成要素及び前記開口パターンの構成要素の少なくとも１つを制御することを特徴とする請求項１９～３４のいずれか１項に記載の立体画像表示装置。

【請求項３６】　観察者の視点位置を自動的に検出する観察条件検出手段又は観察者が入力する観察条件入力手段からの信号に基づき、前記ディスプレイと前記空間光変調素子との間隔を間隔制御手段により制御することを特徴とする請求項１９～３４のいずれか１項に記載の立体画像表示装置。

【請求項３７】　観察者の視点位置を自動的に検出する観察条件検出手段又は観察者が入力する観察条件入力手段からの信号により、前記視差画像情報を構成する３つ以上の原視差画像より前記視差画像を選択して使用することを特徴とする請求項１９～３６のいずれか１項に記載の立体画像表示装置。

【請求項３８】　観察者の視点位置を自動的に検出する観察条件検出手段又は観察者が入力する観察条件入力手段からの信号により、前記視差画像情報を構成するデータより前記視差画像を観察者の視点位置に応じて生成する、若しくは該視差画像情報を構成する少なくとも２つの原視差画像より該視差画像を観察者の視点位置に応じて補間又は再構成して作成することを特徴とする請求項１９～３６のいずれか１項に記載の立体画像表示装置。

【請求項３９】　前記ディスプレイと前記空間光変調素子とを１画素毎又は１走査線毎に同期して前記ストライプ画像と前記開口パターンを表示する際に、該空間光変調素子上の同期して表示する画素に先行する複数画素又は同期して表示する走査線に先行する複数走査線を遮光部として先行して表示することを特徴とする請求項１９～３８のいずれか１項に記載の立体画像表示装置。

【請求項４０】　前記ディスプレイ及び前記空間光変調素子の表示面を走査線に沿って夫々同じ大きさの複数領域に分割し、該複数の領域から相対的に同じ位置の走査線を同時に選択して走査し、該ディスプレイと該空間光変調素子の上に複数の該走査線上で１画素毎又は複数の該走査線の対応する走査線毎に同期して前記ストライプ画像と前記開口パターンを表示することを特徴とする請求項１９～３９のいずれか１項に記載の立体画像表示装置。

【請求項４１】　視差画像ソースからの左右眼用の視差画像を各々ストライプ画素に分割し、該ストライプ画素を所定の順序で配列して合成した１つのストライプ画像を走査しながら順次形成するディスプレイと、該ディスプレイの前方又は後方に所定のピッチの光透過部と光遮光部より成る開口パターンを該走査に同期させて順次形成する空間光変調素子を配置し、該ディスプレイに表示した該ストライプ画像からの光を該開口パターンによって該ストライプ画像の左右夫々の眼に対応するストライプ画素を夫々観察者の左右の眼に入射させることにより立体視するようにしたことを特徴とする立体画像表示装置。

【請求項４２】　前記ディスプレイの前方に前記空間光変調素子を設け、該空間光変調素子の前方又は該ディスプレイと該空間光変調素子との間に水平方向にのみパワーを有するリニアフレネルレンズを有することを特徴とする請求項１９～４１のいずれか１項に記載の立体画像表示装置。

【請求項４３】　光源手段により照明した空間光変調素子を前記ディスプレイの後方に設け、該ディスプレイの前方又は該ディスプレイと該空間光変調素子との間に水平方向にのみパワーを有するリニアフレネルレンズを有することを特徴とする請求項１９～４１のいずれか１項に記載の立体画像表示装置。

【請求項４４】　視差画像ソースからの左右眼用の視差画像を各々ストライプ画素に分割し、該ストライプ画素を所定の順序で配列して合成した１つのストライプ画像をディスプレイ上に走査しながら順次形成し、該ディスプレイに表示した該ストライプ画像からの光を所定のピッチの光透過部と光遮光部とを該走査に同期させて空間光変調素子上に順次形成した開口パターンによって該ストライプ画像の左右夫々の眼に対応するストライプ画素

を夫々観察者の左右の眼に入射させることにより立体視することを特徴とする立体画像表示方法。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は立体画像表示方法及びそれを用いた立体画像表示装置に関し、特に空間光変調素子をパララックス・バリア又はバックライトからの光の指向性を制御する開口パターンとして用いる立体画像表示方法及びそれを用いた立体画像表示装置に関する。

【０００２】

【従来の技術】パララックス・バリア法を用いる立体画像表示方式はS. H. Kaplanによってその技術が開示されている（" Theory of Parallax Barriers" , J. SMPTE, Vol.59, No.7, pp.11-21,1952）。該方式は複数の視差画像の夫々をストライプ画素に分割し、１つの画面上に左右の視差画像を構成するストライプ画素を交互に配列してストライプ画像を形成して表示し、このストライプ画像から所定の距離だけ離れた位置に設けられた所定の光透過部を有するスリット（パララックス・バリアと呼ばれる）を介して、観察者の左右それぞれの眼でそれぞれの眼に対応した視差画像を観察することにより立体視を得るものである。

【０００３】このような従来の装置では、これを通常のテレビの如き2 次元画像表示装置として使用することは出来なかった。

【０００４】そこで特開平3-119889号公報、特開平5-122733号公報においては、パララックス・バリアを透過形液晶素子などにより電子的に形成し、バリア・ストライプの形状や位置などを電子的に制御して変化するようにした立体画像表示装置が開示されている。図34は特開平3-119889号公報に開示されている立体画像表示装置の要部概略図である。本装置では画像表示面101 に厚さdのスペーサー102 を介して透過形液晶表示素子から成る電子式パララックス・バリア103 を配置している。画像表示面101 には2 方向または多方向から撮像した複数の視差画像を夫々縦のストライプ画素に分割し、これらの複数の視差画像のストライプ画素を交互に所定の順序で配列して構成したストライプ画像として表示し、一方、電子式パララックス・バリア103 にはXYアドレスをマイクロコンピュータ104 等の制御手段で指定することにより電子式パララックス・バリア103 の表示面上の任意の位置に縦長のバリア・ストライプを形成し、前記パララックス・バリア法の原理に従って立体視を可能としている。

【０００５】この装置において、2 次元画像（非立体画像）表示を行う際には、電子式パララックス・バリア103 にバリア・ストライプを形成せずに、画像表示領域の全域にわたって無色透明な状態にすることで2 次元画像表示を行う。これによって、従来のパララックス・バリア法を用いた立体画像表示方式では出来なかった通常の2 次元画像表示との両立を実現している。

【０００６】図35は特開平5-122733号公報に開示されている液晶パネルディスプレイと電子式バリアによって構成された立体画像表示装置の要部概略図である。この立体画像表示装置では2 枚の液晶層115、125 を夫々2 枚の偏光板111、118 及び121、128で挟み、液晶層115 は画像表示手段、液晶層125 は電子式バリア形成手段とした構成にしている。本装置においても、2 次元画像表示を行う際には、液晶層125にバリア・ストライプの形成を止めて、画像表示領域の全域にわたって無色透明な状態にすることで2 次元画像表示を行い、通常の2 次元画像表示装置との両立を実現している。

【０００７】

【発明が解決しようとする課題】特開平3-119889号公報に開示されている従来例では、画像表示面101 には少なくとも2 枚の視差画像を夫々ストライプ画素に分割し、これら2 つの視差画像からのストライプ画素を交互に配列して1 つのストライプ画像を合成し、これを表示していた。従って画像表示装置の解像度は元の視差画像に対して少なくとも2分の1 に低下してしまう問題があった。

【０００８】更に上記従来例では、画像表示面101 に表示された縦のストライプ画素から成るストライプ画像と電子式パララックス・バリア103 に形成するパララックス・バリアパターンとを同期をとって表示していないために、左右画像のクロストークが発生し、またフリッカーを生じる場合があり、目障りであった。

【０００９】また、観察者の視点移動がなければバリア・ストライプの表示位置は変化しないので、ストライプ状にローカライズされた輝度の低下を生じてしまうという問題があった。

【００１０】さらに、画像表示手段が液晶等の場合は、画像表示面がストライプ状の画素構造を有し、この画像を同様なストライプ状のバリア・ストライプを介して観察することから、モアレ縞を生じ易いという問題があった。

【００１１】さらに、特開平5-122733号公報に開示された従来例では、装置全体で4 枚の偏光板を使用しているために、この吸収により輝度が低下するという問題があった。

【００１２】加えてこれらの従来例では、観察者が両眼間隔（基線長）だけ横方向に移動した場合、ストライプ画像の右眼画像と左眼画像の表示位置を入れ換えることで逆立体視を防いでいたが、前後の視点位置の変化には対応できないという問題があった。

【００１３】更に従来例では、逆立体視を防ぐために観察者の視点位置変化に応じて常に正しい視差画像が眼に入射する様に追従させているだけで、観察している立体画像は常に同じであり、なめらかな立体感を得ることが

できる「回り込み立体視効果」が得られないという問題があった。

【００１４】本発明の目的は、パララックス・バリア法を用いて、ディスプレイへの画像表示と空間光変調素子への開口パターンの表示を夫々対応する画素毎或は対応する走査線毎に同期して切り換えることにより、左右の視差画像のクロストークが少なく、しかもフリッカー及びモアレ縞が生じ難い優れた立体画像表示方法及びそれを用いた立体画像表示装置の提供である。

【００１５】その他、

（１－１） 第1のストライプ画像と第2のストライプ画像及び第1のパララックス・バリアパターンと第2のパララックス・バリアパターンの切換えを夫々対応する画素毎或は対応する走査線毎に同期して切り換えて、高速で表示することにより、クロストークが極めて少なく、視差画像の夫々をディスプレイの表示面全面に欠落無く高解像度に認識できる。

（１－２） 従来の装置では4枚の偏光板を使用しているために、この偏光板の吸収により輝度が低下するという問題があったのに対し、偏光板を1枚削減することができ、表示輝度を向上させることができる。

（１－３） 観察者の視点位置を自動的に検出する観察条件検出手段又は観察者が入力する観察条件入力手段からの信号により、ディスプレイに表示するストライプ画素の幅、空間光変調素子に形成する光透過部・光遮光部の幅、或はディスプレイと空間光変調素子の間隔或はストライプ画素と光透過部との相対的位置関係を制御することにより観察者が移動しても常に良好に立体視できる。

（１－４） 観察者の視点位置を自動的に検出する観察条件検出手段又は観察者が入力する観察条件入力手段からの信号により、視差画像ソースが有する視差画像情報を構成する３つ以上の原視差画像より２つの視差画像を選択して使用する、若しくは該視差画像情報を構成するデータより２つの視差画像を生成する、若しくは該視差画像情報を構成する少なくとも２つの原視差画像より２つの視差画像を補間又は再構成して作成することにより、観察者が移動した際、それに応じて視点位置の異なる視差画像を適切に構成して、所謂滑らかな「回り込み効果」を与える立体画像を表示する。

（１－５） ディスプレイに表示する２次元画像の中に、クロストークが無く高解像の立体画像を部分的に表示することができる。

（１－６） インターレース駆動を採用することにより、ディスプレイや空間光変調素子として多少表示速度が遅い液晶素子等を用いてもフリッカーの無い高精細な立体画像を表示することができる。

（１－７） ディスプレイ及び空間光変調素子を縦方向に走査線走査して画像を表示するように構成することにより、画面の駆動回路を簡易な構成にできる。

（１－８） ディスプレイ及び空間光変調素子の表示面を走査線に沿って夫々同じ大きさの複数領域に分割し、複数の領域から相対的に同じ位置の走査線を同時に選択して同期して駆動・表示することにより、より短時間で１画面の表示を行うことが出来、更にフリッカーの少ない立体画像表示表示が可能になる。

（１－９） ディスプレイと空間光変調素子とを１画素毎又は１走査線毎に同期してストライプ画像と開口パターンを表示する際に、該空間光変調素子上の同期して表示する画素に先行する複数画素又は同期して表示する走査線に先行する複数走査線を遮光部として先行して表示させることにより、左右の視差画像のクロストークを一層低減することが出来ると共に、異なる特性の液晶パネルを用いても、クロストークを低減することが出来、夫々のパネルの駆動マージンを大きくすることができる。

（１－１０） リニアフレネルレンズを用いることにより、ディスプレイと空間光変調素子を同じ仕様の液晶素子で構成することができ、低コストの立体画像表示装置を達成する。等の少なくとも１つの効果を有する立体画像表示方法及びそれを用いた立体画像表示装置の提供を目的とする。

【００１６】

【課題を解決するための手段】本発明の立体画像表示方法は、

（２－１） 視差画像情報を有する視差画像ソースからの複数の視差画像の夫々をストライプ画素に分割し、該複数のストライプ画素の一部を所定の順序で配列して１つのストライプ画像を合成してディスプレイ上に表示し、該ディスプレイの前方又は後方の所定の位置に設けた空間光変調素子上に所定のピッチの光透過部と光遮光部より成る開口パターンを表示し、該空間光変調素子によって該ストライプ画像の左右夫々の眼に対応するストライプ画素を夫々観察者の左右の眼に入射させることにより立体視を得る際、該ディスプレイと該空間光変調素子とを対応して走査する走査線上で１画素毎又は１走査線毎に同期して該ストライプ画像と該開口パターンを表示すること等を特徴としている。

【００１７】特に、

（２－１－１） 前記ディスプレイと前記空間光変調素子とを対応して走査する走査線はインターレース走査を行う。

（２－１－２） 前記ディスプレイと前記空間光変調素子とを対応して走査する走査線は鉛直方向に走査する。

（２－１－３） 前記複数の視差画像は左右の視差画像であり、前記ストライプ画像は該右の視差画像を分割したストライプ画素のうちの奇数番目のストライプ画素と該左の視差画像を分割したストライプ画素のうちの偶数番目のストライプ画素とを交互に配列して合成した第１のストライプ画像、或は該右の視差画像を分割した該ストライプ画素のうちの偶数番目のストライプ画素と該左

の視差画像を分割した該ストライプ画素のうちの奇数番目のストライプ画素とを交互に配列して合成した第2のストライプ画像であり、該2つのストライプ画像の1つを該ディスプレイ上に表示した後、続いて他方のストライプ画像を表示し、その際、前記空間光変調素子上に光透過部と光遮光部とを切り換えた開口パターンを表示する。

（2－1－4） 前記ストライプ画像は前記ディスプレイの表示面の一部分に表示し、該表示面の残余の部分には非ストライプ画像を表示し、前記空間光変調素子の表示面中、該ディスプレイに表示する該ストライプ画像に対応する部分には開口パターンを表示し、該空間光変調素子の表示面中の残余の部分を透光状態にする。

（2－1－5） 前記ストライプ画像は前記ディスプレイの表示面の一部分に表示し、該表示面の残余の部分には非ストライプ画像を表示し、前記空間光変調素子の表示面には全面に開口パターンを表示する。

（2－1－6） 前記ディスプレイに表示する前記ストライプ画像を構成する各ストライプ画素の表示幅及び／又は前記空間光変調素子に表示する前記開口パターンの光透過部及び光遮光部の表示幅がそれぞれの表示面を構成している画素の複数個の幅である。

（2－1－7） 前記ディスプレイに表示する前記ストライプ画像を構成する各ストライプ画素の表示幅は該ディスプレイの表示面を構成している画素の一画素の幅であり、前記空間光変調素子に表示する前記開口パターンの光透過部・光遮光部の表示幅は該空間光変調素子の表示面を構成している画素の複数個の幅である。

（2－1－8） 前記ディスプレイに表示する前記ストライプ画像を構成する各ストライプ画素の表示幅は該ディスプレイの表示面を構成している画素の複数個の幅であり、前記空間光変調素子に表示する前記開口パターンの光透過部及び光遮光部の表示幅は該空間光変調素子の表示面を構成している画素の一画素の幅である。

（2－1－9） 前記ディスプレイ及び前記空間光変調素子の各表示面がマトリックス構造の画素を有する。

（2－1－10） 前記ディスプレイに表示するストライプ画像からは所定の偏光光より成る光を射出している。

（2－1－11） 前記空間光変調素子は液晶素子で構成している。

（2－1－12） 観察者の視点位置を自動的に検出する観察条件検出手段又は観察者が入力する観察条件入力手段からの信号により、前記ストライプ画像の構成要素及び前記開口パターンの構成要素の少なくとも1つを制御する。

（2－1－13） 観察者の視点位置を自動的に検出する観察条件検出手段又は観察者が入力する観察条件入力手段からの信号に基づき、前記ディスプレイと前記空間光変調素子との間隔を間隔制御手段により制御する。

（2－1－14） 観察者の視点位置を自動的に検出する観察条件検出手段又は観察者が入力する観察条件入力手段からの信号により、前記視差画像情報を構成する3つ以上の原視差画像より前記視差画像を選択して使用する。

（2－1－15） 観察者の視点位置を自動的に検出する観察条件検出手段又は観察者が入力する観察条件入力手段からの信号により、前記視差画像情報を構成するデータより前記視差画像を観察者の視点位置に応じて生成する、若しくは該視差画像情報を構成する少なくとも2つの原視差画像より該視差画像を観察者の視点位置に応じて補間又は再構成して作成する。

（2－1－16） 前記ディスプレイと前記空間光変調素子とを1画素毎又は1走査線毎に同期して前記ストライプ画像と前記開口パターンを表示する際に、該空間光変調素子上の同期して表示する画素に先行する複数画素又は同期して表示する走査線に先行する複数走査線を遮光部として先行して表示させる。

（2－1－17） 前記ディスプレイ及び前記空間光変調素子の表示面を走査線に沿って夫々同じ大きさの複数領域に分割し、該複数の領域から相対的に同じ位置の走査線を同時に選択して走査し、該ディスプレイと該空間光変調素子の上に複数の該走査線上で1画素毎又は複数の該走査線の対応する走査線毎に同期して前記ストライプ画像と前記開口パターンを表示する。

【0018】又、本発明の立体画像表示装置は、

（2－2） 視差画像情報を有する視差画像ソースからの複数の視差画像の夫々をストライプ画素に分割し、該複数のストライプ画素の一部を所定の順序で配列して合成した1つのストライプ画像をディスプレイ上に表示し、該ディスプレイの前方又は後方の所定の位置に設けた空間光変調素子上に所定のピッチの光透過部と光遮光部より成る開口パターンを表示し、該空間光変調素子によって該ストライプ画像の左右夫々の眼に対応するストライプ画素を夫々観察者の左右の眼に入射させることにより立体視を得る際、該ディスプレイと該空間光変調素子とを対応して走査する走査線上で1画素毎又は1走査線毎に同期して該ストライプ画像と該開口パターンを表示していること等を特徴としている。

【0019】特に、

（2－2－1） 前記ディスプレイと前記空間光変調素子とを対応して走査する走査線はインターレース走査を行っている。

（2－2－2） 前記ディスプレイと前記空間光変調素子とを対応して走査する走査線は鉛直方向に走査している。

（2－2－3） 前記複数の視差画像は左右の視差画像であり、前記ストライプ画像は該右の視差画像を分割したストライプ画素のうちの奇数番目のストライプ画素と該左の視差画像を分割したストライプ画素のうちの偶数

番目のストライプ画素とを交互に配列して合成した第1のストライプ画像、又は該右の視差画像を分割した該ストライプ画素のうちの偶数番目のストライプ画素と、該左の視差画像を分割した該ストライプ画素のうちの奇数番目のストライプ画素とを交互に配列して合成した第2のストライプ画像であり、該第1のストライプ画像の表示に際して表示する開口パターンと該第2のストライプ画像の表示に際して表示する開口パターンとは互いに光透過部と光遮光部とが逆の関係にあり、該2つのストライプ画像を連続して表示する。

（2－2－4） 前記ストライプ画像は前記ディスプレイの表示面の一部分に表示し、該表示面の残余の部分には非ストライプ画像を表示し、前記空間光変調素子の表示面中、該ディスプレイに表示する該ストライプ画像に対応する部分には開口パターンを表示し、該空間光変調素子の表示面中の残余の部分を透光状態にする。

（2－2－5） 前記ストライプ画像は前記ディスプレイの表示面の一部分に表示し、該表示面の残余の部分には非ストライプ画像を表示し、前記空間光変調素子の表示面には全面に開口パターンを表示する。

（2－2－6） 前記ディスプレイに表示する前記ストライプ画像を構成する各ストライプ画素の表示幅及び／又は前記空間光変調素子に表示する前記開口パターンの光透過部及び光遮光部の表示幅がそれぞれの表示面を構成している画素の複数個の幅である。

（2－2－7） 前記ディスプレイに表示する前記ストライプ画像を構成する各ストライプ画素の表示幅は該ディスプレイの表示面を構成している画素の一画素の幅であり、前記空間光変調素子に表示する前記開口パターンの光透過部及び光遮光部の表示幅は該空間光変調素子の表示面を構成している画素の複数個の幅である。

（2－2－8） 前記ディスプレイに表示する前記ストライプ画像を構成する各ストライプ画素の表示幅は該ディスプレイの表示面を構成している画素の複数個の幅であり、前記空間光変調素子に表示する前記開口パターンの光透過部・光遮光部の表示幅は該空間光変調素子の表示面を構成している画素の一画素の幅である。

（2－2－9） 前記ディスプレイ及び前記空間光変調素子の各表示面がマトリックス構造の画素を有する。

（2－2－10） 前記空間光変調素子は液晶素子である。

（2－2－11） 前記空間光変調素子は強誘電性液晶素子である。

（2－2－12） 前記ディスプレイは液晶素子である。

（2－2－13） 前記ディスプレイは強誘電性液晶素子である。

（2－2－14） 前記ディスプレイを自発光型テレビと1枚の偏光板とで構成している。

（2－2－15） 前記ディスプレイに表示するストライプ画像からは所定の偏光光より成る光を射出し、前記空間光変調素子を液晶素子と1枚の偏光板で構成している。

（2－2－16） 観察者の視点位置を自動的に検出する観察条件検出手段又は観察者が入力する観察条件入力手段からの信号により、前記ストライプ画像の構成要素及び前記開口パターンの構成要素の少なくとも1つを制御する。

（2－2－17） 観察者の視点位置を自動的に検出する観察条件検出手段又は観察者が入力する観察条件入力手段からの信号に基づき、前記ディスプレイと前記空間光変調素子との間隔を間隔制御手段により制御する。

（2－2－18） 観察者の視点位置を自動的に検出する観察条件検出手段又は観察者が入力する観察条件入力手段からの信号により、前記視差画像情報を構成する3つ以上の原視差画像より前記視差画像を選択して使用する。

（2－2－19） 観察者の視点位置を自動的に検出する観察条件検出手段又は観察者が入力する観察条件入力手段からの信号により、前記視差画像情報を構成するデータより前記視差画像を観察者の視点位置に応じて生成する、若しくは該視差画像情報を構成する少なくとも2つの原視差画像より該視差画像を観察者の視点位置に応じて補間又は再構成して作成する。

（2－2－20） 前記ディスプレイと前記空間光変調素子とを1画素毎又は1走査線毎に同期して前記ストライプ画像と前記開口パターンを表示する際に、該空間光変調素子上の同期して表示する画素に先行する複数画素又は同期して表示する走査線に先行する複数走査線を遮光部として先行して表示する。

（2－2－21） 前記ディスプレイ及び前記空間光変調素子の表示面を走査線に沿って夫々同じ大きさの複数領域に分割し、該複数の領域から相対的に同じ位置の走査線を同時に選択して走査し、該ディスプレイと該空間光変調素子の上に複数の該走査線上で1画素毎又は複数の該走査線の対応する走査線毎に同期して前記ストライプ画像と前記開口パターンを表示する。こと等を特徴としている。

【0020】更に、本発明の立体画像表示装置は、

（2－3） 視差画像ソースからの左右眼用の視差画像を各々ストライプ画素に分割し、該ストライプ画素を所定の順序で配列して合成した1つのストライプ画像を走査しながら順次形成するディスプレイと、該ディスプレイの前方又は後方に所定のピッチの光透過部と光遮光部より成る開口パターンを該走査に同期させて順次形成する空間光変調素子を配置し、該ディスプレイに表示した該ストライプ画像からの光を該開口パターンによって該ストライプ画像の左右夫々の眼に対応するストライプ画素を夫々観察者の左右の眼に入射させることにより立体視するようにしたこと等を特徴としている。

【００２１】特に、

（２－３－１） 前記ディスプレイの前方に前記空間光変調素子を設け．該空間光変調素子の前方又は該ディスプレイと該空間光変調素子との間に水平方向にのみパワーを有するリニアフレネルレンズを有する。

（２－３－２） 光源手段により照明した空間光変調素子を前記ディスプレイの後方に設け．該ディスプレイの前方又は該ディスプレイと該空間光変調素子との間に水平方向にのみパワーを有するリニアフレネルレンズを有する。こと等を特徴としている。

【００２２】又．本発明の立体画像表示方法は．

（２－４） 視差画像ソースからの左右眼用の視差画像を各々ストライプ画素に分割し、該ストライプ画素を所定の順序で配列して合成した１つのストライプ画像をディスプレイ上に走査しながら順次形成し、該ディスプレイに表示した該ストライプ画像からの光を所定のピッチの光透過部と光遮光部とを該走査に同期させて空間光変調素子上に順次形成した開口パターンによって該ストライプ画像の左右夫々の眼に対応するストライプ画素を夫々観察者の左右の眼に入射させることにより立体視すること等を特徴としている。

【００２３】

【発明の実施の形態】図１は本発明の立体画像表示装置の実施形態１の要部概略図である。又．図２は実施形態１の立体画像表示方法の説明図．図３は実施形態１の駆動方法の説明図．図４は実施形態１の表示状態の説明図である。なお．図中、画像表示部分は水平の断面図である。図中、１はディスプレイであり．例えばバックライト光源を有する液晶素子(LCD) などであり、その表示面はマトリックス構造の多数の画素から成り、ノーインターレースの走査線走査によって画像を表示する。11(11$_1$) はディスプレイ１の画像表示面に表示する後述のストライプ画像の状態を模式的に表した模式図である。

【００２４】２は空間光変調素子であり、透過型液晶素子などで構成しており、その表示面はマトリックス構造の多数の画素から成っており、ディスプレイ１に立体画像を表示する際は所定のピッチの光透過部（開口部）と光遮光部を水平方向に配列してパララックス・バリアパターン（開口パターン）2_A又は2_Bを形成する（表示する）。A_R,A_L は夫々観察者の右眼、左眼である。

【００２５】なお、本明細書においてはディスプレイ１又は空間光変調素子２の観察者側を" 前方" と呼び、その反対側を" 後方" と呼ぶ。従って本実施形態ではディスプレイ１の前方に空間光変調素子２ を配置している。

【００２６】15は視差画像ソースであり、例えば多チャンネルのVTR．或は多チャンネルカメラを有する多チャンネル撮像装置．或は被写体の３次元データなどから構成されている。以下これらからの複数の画像及び３次元データを視差画像情報と呼ぶこととする。なお．多チャンネルのVTR．多チャンネル撮像装置等では複数の画像を有しているが．これらの画像から視差画像（視差の有る画像）が選択されるので．これらの複数の画像を原視差画像と呼ぶこととする。

【００２７】９は観察条件入力手段であり、観察者の観察位置情報やディスプレイ１に表示する立体画像の表示領域等の情報を入力する。３は画像処理手段であり、視差画像ソース15が有する視差画像情報より右眼用の視差画像R_Sと左眼用の視差画像L_Sを取り出し、これらの視差画像R_S及びL_Sを水平方向に分割して縦長のストライプ状のストライプ画素を生成し．それらを交互に並べて１枚のストライプ画像に合成する。以下．視差画像R_Sに基づくストライプ画素をR_i (i=1,2,3,4･･･)と表示し．視差画像L_Sに基づくストライプ画素をL_i (i=1,2,3,4･･･)と表す。

【００２８】４はディスプレイ駆動回路であり．画像処理手段３が合成して出力するストライプ画像をディスプレイ１の表示面に表示する。５はバリア駆動回路であり．画像処理手段３からの信号により空間光変調素子２を駆動してその上にパララックス・バリアパターンを形成する。

【００２９】本実施形態のストライプ画像11とパララックス・バリアパターンとの関係について説明する。図１に示すように．観察者の両眼間隔（基線長）をO．画像表示面上の表示画像（ストライプ画像）11(11$_1$) から観察者の眼までの観察距離をC、ディスプレイ１と空間光変調素子（パララックス・バリア）２との間隔をD、空間光変調素子２に形成したパララックス・バリアパターンの開口部の幅をB'、ディスプレイ１に表示するストライプ画像を構成するストライプ画素の画素間隔（幅）をPとすると、立体視を得る為にはこれらの間には以下の関係を満足させる必要がある。

【００３０】

$$D = P \cdot C/(O+P) \quad \text{----------(1)}$$

$$B' = P \cdot (C-D)/C \quad \text{----------(2)}$$

なお．実際には観察位置において観察幅は有限の広がりをもつので、これらの諸量は若干変更して設定される。これらの関係については．S．H．Kaplanが前記文献中で詳細に述べている。

【００３１】本実施形態においては．ディスプレイ１として画素サイズ 0.110mm（横)× 0.330mm（縦）の液晶ディスプレイを用い、その１画素をそれぞれの視差画像のストライプ画素の幅にしたので 画素間隔はP= 0.110mmとなる。一方、観察条件として基線長をO=65mm、観察距離をC= 1000 mmと設定しているので．空間光変調素子２の構成諸元は D=1.69mm ． B'=0.1098mm となる。なお．観察幅の広がりを考慮し多少の微調整を行っている。

【００３２】図1,2,3,4によって本発明の立体画像表示方法について説明する。

【００３３】即ち、ある時刻において（図2(A)の表示状

態の時）、画像処理手段3 は視差画像ソース15より2 つの視差画像R_8及びL_8を取り出し、それらを縦長のストライプ画素R_1,L_1に分割し、これらのストライプ画素を例えば図上表示面の左端から$R_1L_2R_3L_4R_5L_6$・・・と交互に並べて、第1 のストライプ画像11_Aとして合成する。この第1 のストライプ画像11_Aのデータはディスプレイ駆動回路4 に入力され、ディスプレイ駆動回路4 はディスプレイ1 の画像表示面に第1 のストライプ画像11_Aを表示する。

【００３４】同時に、画像処理手段3 は上記ストライプ画像のデータの出力に同期して、バリア駆動回路5 にもパララックス・バリアパターンの画像データを入力し、バリア駆動回路5 は空間光変調素子2 上の点G より閉閉閉開閉閉・・・という順番で幅B'の光透過部と光遮光部とを交互に形成した第1 のパララックス・バリアパターン2_Aを表示する。

【００３５】このパララックス・バリアパターンの形成領域は、前記ディスプレイ1 のストライプ画像11が表示されている画像領域（図1 においては全面の場合を示している）に対応している。

【００３６】この時右眼A_Rには第1 のパララックス・バリアパターン2_Aを介してストライプ画素$R_1R_3R_5$・・・・で構成された右眼用の視差画像のみが入射し、左眼A_Lには第1 のパララックス・バリアパターン2_Aを介してストライプ画素$L_2L_4L_6$・・・・で構成された左眼用の視差画像のみが入射し、観察者は従来のパララックス・バリア法と同じ原理により、第1 のストライプ画像11_Aを立体視できる。

【００３７】1 フレーム走査し終わって再度上記と同一の走査線を走査している時刻において（図2(B)の表示状態の時）、ディスプレイ1 に表示するストライプ画像11として上記の順番とは逆、つまりストライプ画素を$L_1R_2L_3R_4L_5R_6$・・・と並べた第2 のストライプ画像11_Bを表示し、空間光変調素子2 には点G より上記の順番と逆の閉閉閉開閉閉・・・という順番で光透過部と光遮光部とを交互に形成した第2 のパララックス・バリアパターン2_Bを表示する。

【００３８】この時右眼A_Rには第2 のパララックス・バリアパターン2_Bを介してストライプ画素$R_2R_4R_6$・・・・で構成された右眼用の視差画像のみが入射し、左眼A_Lにはパララックス・バリアパターン2_Bを介してストライプ画素$L_1L_3L_5$・・・・で構成された左眼用の視差画像のみが入射し、観察者は従来のパララックス・バリア法と同じ原理により、第2 のストライプ画像11_Bを立体視できる。

【００３９】そして、交互にこの2 つの表示状態となる様にディスプレイ1 と空間光変調素子2 とを画素毎に同期して走査し、ストライプ画像とパララックス・バリアパターンとを表示することで、右眼ではストライプ画素$R_2R_4R_6R_8$・・・・で構成された視差画像R_8すべてが、左眼ではストライプ画素$L_1L_3L_5L_7$・・・・で構成された視差画像L_7

すべてがフリッカー無くそれぞれ観察される。

【００４０】図3,4 によって、さらに詳細に実施形態1 の作用を説明する。

【００４１】前記のように、例えば第1 のストライプ画像11_Aと第1 のパララックス・バリアパターン2_Aを表示する際、図3 に示すようにディスプレイ1 と空間光変調素子2 の走査線（Y1,Y2,Y3,Y4・・・・）を画像処理手段3 からの同期信号を介して夫々Y ドライバー6,6'で駆動し、同時にX ドライバー7 、8 からそれぞれディスプレイ駆動信号とバリア駆動信号を同期して入力する。つまりディスプレイ1 の第1走査線Y1と空間光変調素子2 の走査線Y1とを同時に駆動し、又ディスプレイ1 の第1 走査線Y1上の画素X_1と空間光変調素子2 の第1 走査線Y1（対応して走査する走査線）上の画素X_1を同期して駆動してその画素に画像を表示するのである。

【００４２】先ず、ディスプレイ1 の表示面全面に第2 のストライプ画像11_Bが表示され、空間光変調素子2 には第2 のパララックス・バリアパターン2_Bが表示されていたとする。図4 (A) に示す様に以上の状態からディスプレイ1 の第1 走査線Y1上の画素に、左右の視差画像のストライプ画素から合成されるRLRLRL・・・・（正しくは$R_1L_2R_3L_4R_5L_6$・・・であるが左のように略記する）と並んだ第1 のストライプ画像11_Aの該当部分を順次表示するとともに、空間光変調素子2 の第1 走査線Y1上の画素には図4 (B) に示す様に閉閉閉開閉閉・・・と光遮光部と光透過部とが交互に並んだ第1 のパララックス・バリアパターン2_Aを順次ディスプレイ1 と画素毎に同期して表示する。

【００４３】そして、次に第2 走査線Y2を選択して、ディスプレイ1 と空間光変調素子2 の第2 走査線Y2上の画素に前と同様に第1 のストライプ画像11_Aの該当部分と第1のパララックス・バリアパターン2_Aの該当部分を画素毎に同期して表示する。

【００４４】図4 ではその全走査が終わる途中、第5 走査線Y5を選択し、ディスプレイ1 の第7 画素X_7にストライプ画素R_7の画素データを表示し（図4 (A)）、これに同期して空間光変調素子2 の第7 画素X_7に光遮光部を形成した（図4 (B)）瞬間の様子を模式的に示している。従って、ディスプレイ1 の上部には第1 のストライプ画像11_Aが表示され、下部には第2 のストライプ画像11_Bが表示されている。又、空間光変調素子2 の上部には第1 のパララックス・バリアパターン2_Aが表示され、下部には第2 のパララックス・バリアパターン2_Bが表示されている。

【００４５】順次これを繰り返して、最後の走査線の走査が終われば表示画面全体に第1 のストライプ画像11_Aが表示され、これを第1 のパララックス・バリアパターン2_Aを形成している空間光変調素子2 を介して観察することにより第1 のストライプ画像11_Aを立体画像として観察できる。

【００４６】次いで、第1 走査線から順次走査し．その際ディスプレイ1 に表示するストライプ画像11として上記の順番とは逆．つまりストライプ画素がLRLRLR･･･（正しくは$L_1R_2L_3R_4L_5R_6$･･･ であるが左のように略記する）と並んだ第2 のストライプ画像11_e の該当部分を表示し．空間光変調素子2 に第2 のパララックス・バリアパターン2_eとして上記の順番と逆の開閉閉閉閉閉・・・という順番で光透過部と光遮光部とを交互に形成して表示し．この空間光変調素子2 を介してディスプレイ1 を観察することにより第2 のストライプ画像11_e を立体画像として観察できる。

【００４７】従って本実施形態では．ストライプ画像11$_o$ と11_e とを交互に立体視するので観察者の各眼A_R,A_L に夫々の視差画像R_s，L_sが欠落無く表示されることになり．視差画像の解像度を損なうこと無く高画質の立体画像が観察できる。これは．従来のパララックス・バリア法を用いた立体画像表示装置では解像度が使用するディスプレイ解像度の少なくとも1/2 に低下することを考えれば．2 倍の高精細画像となっている。

【００４８】しかも、本実施形態ではディスプレイ1 と空間光変調素子2 の走査線上の1 画素毎に同期をとって駆動することにより、ストライプ画像の表示中．如何なる時間においても、ストライプ画素とそれに対応するパララックス・バリアパターンの開口部とが常に同期して変化して立体画像を正しく観察できる関係を保っている。従って、本実施形態では左右の視差画像のクロストークは著しく低減される。

【００４９】さらに、本実施形態では空間光変調素子2 上に形成するパララックス・バリアパターンの光透過部と光遮光部とが交互に入れ換わるので．モアレパターンのコントラストが低下する．パララックス・バリアパターンの光透過部・光遮光部の繰り返し構造が目立たないという効果を有する。

【００５０】更に、本実施形態に用いるディスプレイ1 及び空間光変調素子2 は高速のフレームレートを有するものを用いることが理想的であるが．本実施形態ではストライプ画像とパララックス・バリアパターンとを同期させて表示しているので．左右夫々の眼にはクロストークを生じることなく、常に夫々の視差画像が入射しており．観察者はフリッカーを感じることが無いので60Hz～120Hz のフレームレートのものでも使用することができる。

【００５１】なお、空間光変調素子2 はその上に形成するパララックス・バリアパターンにより右眼の視差画像と左眼の視差画像との分離を行う為に．高コントラストかつ高速駆動可能なものが必要であり．これらの点から強誘電性液晶素子(FLC) は本実施形態のディスプレイ1 や空間光変調素子2 として用いるのに好適である。

【００５２】又．ディスプレイ1 や空間光変調素子2 として液晶素子を用いる場合には同一種類の液晶素子を用

いれば表示速度（応答速度）が同じであるので同期を確保し易く、又同じ駆動回路を使用できるので好都合である。

【００５３】なお、本実施形態では画像処理手段3 からの同期信号で駆動しているが、駆動方法としてはディスプレイ駆動回路4 で同期信号を発生させてバリア駆動回路5の駆動タイミングをとったり．Y ドライバーで同期をとることなど種々の駆動方法を用いることが出来る。

【００５４】又．本実施形態ではディスプレイ1 の1 画素をストライプ画像の間隔P に等しい場合、即ちストライプ画素R_1,L_2･･･ がそれぞれディスプレイ1 の1 画素に相当する場合について示したが、ストライプ画素R_1,L_2 の画素幅はディスプレイ1の複数の画素幅としても良く．例えばカラー表示を行う際のRGB の画素幅を間隔Pとしても良い。

【００５５】また、ここでは2 枚の視差画像を表示する場合について説明したが複数の視差画像を合成してストライプ画像を作成し、これを適切なパララックス・バリアを介して観察する『パララックス・パノラマグラム』においても同様の方法を用いることができる。

【００５６】又．本発明の空間光変調素子2 は鉛直方向に長い長方形の開口部を形成するものであるから．マトリックス状の画素構造で無くても良く．縦ライン状の画素構造でも良い。

【００５７】なお、ストライプ画素の幅P 、数等はストライプ画像の構成要素であり、パララックス・バリアパターンの開口部・遮光部の幅B 等は開口パターン（パララックス・バリアパターン）の構成要素である。

【００５８】本実施形態では観察条件入力手段9 からの信号によって以上のようにストライプ画像の構成要素及び開口パターンの構成要素の少なくとも1 つを制御している。

【００５９】図5 は本発明の立体画像表示装置の実施形態2 の要部概略図である。本実施形態は実施形態1 の構成においてディスプレイ1 及び空間光変調素子2 として特にTN液晶素子（TN液晶セル）を用いた実施形態である。その他の部分は実施形態1と同じである。

【００６０】1 はストライプ画像11を表示するディスプレイであり、2 枚の偏光板22、24で挟まれたTN液晶セル23（ガラス基板や電極等は不図示）を反射板や導光板を有するバックライト21で照明するように構成している。従ってディスプレイ1 に表示する画像からは直線偏光の光が射出する。2 は空間光変調素子であり、ディスプレイ1 の側にTN液晶セル25を．観察者側に1 枚の偏光板26を設けて構成しており、ストライプ状のパララックス・バリアパターンを表示する。

【００６１】本実施形態でも実施形態1 と同様にディスプレイ1 上のストライプ画像11_o,11_e と空間光変調素子2 上のパララックス・バリアパターン2_o,2_e を同期して切り替えて表示するので視差画像の解像度も低下せず、

良好な画質の立体画像を観察できる。

【００６２】図6は本実施形態における偏光板の偏光軸の方向と観察画像との関係についての説明図である。例えば本実施形態のディスプレイ1としてノーマリー・ホワイトモードの液晶ディスプレイを使用し、図示する様に偏光板22の偏光軸が紙面に垂直な方向に向いている場合を考える。この時偏光板22、24はクロスニコルの状態にしており、バックライト21からの光のうちTN液晶セル23に電圧が印加されていない部分（OFF 部分）に入射した光のみが偏光軸が90°回転し、偏光板24を透過する。

【００６３】一方、空間光変調素子2 はやはりTN液晶セル25と1 枚の偏光板26から構成されており、パララックス・バリアパターンの開口部（ON部分）のみ電圧が印加される。従って、ディスプレイ1 から透過してきた表示画像光（偏光軸は紙面に平行である）は、このパララックス・バリアパターンの開口部（ON部分）において偏光面に変調を受けず、偏光板26（偏光軸は紙面に平行である）をそのまま透過する。左眼画像(L画像）は左眼A_Lの方向へ透過する。そして右眼画像(R画像）は右眼A_Rの方向へ透過して、立体画像が観察される。以上が偏光板の偏光軸の方向と観察画像との関係の説明である。

【００６４】特開平3-119889号公報に開示されている従来の装置では4 枚の偏光板を使用しているために、この偏光板の吸収により表示画像の輝度が低下するという問題があった。これに対し、本実施形態では偏光板を1 枚削減しているので、表示画像の輝度を向上させている。

【００６５】空間光変調素子2 を構成する偏光板の偏光軸の方向は上記以外にも設定可能である。例えば図7 に示す様に偏光板26' の偏光軸は紙面に垂直であっても良く、その時は空間光変調素子2 に表示するパララックス・バリアパターンの開口部には電圧を印加しない。この場合、ディスプレイ1 から透過してきた画像表示光（偏光軸は紙面に平行である）は、この開口部（OFF 部分）で偏光面を90°回転させ、偏光軸が紙面に垂直に設定された偏光板26' を透過し、それぞれの眼に入射する。つまり、この場合はそれぞれの眼に入射する画像光の偏光方向は、図6 の場合とは直交している。

【００６６】同様のことがディスプレイ1 に使用する液晶パネルの表示モードによっても生じるが、それぞれの状態に応じて、本発明の立体画像表示装置に使用する3 枚の偏光板の偏光軸を設定すれば良い。

【００６７】なお、図8 に示す様に、ディスプレイ1 をCRT の様な自発光型のディスプレイと1 枚の偏光板とで構成することもできる。

【００６８】図9 は本発明の立体画像表示装置の実施形態3 の要部概略図である。本実施形態は観察者の視点位置を自動的に検出し、それに応じて立体画像表示装置の動作を制御することで広い範囲にわたって良好な立体視を可能とする装置である。

【００６９】図中、36は観察者映像入力手段であり、本

装置を観察する観察者の映像を入力する。本実施形態の観察者映像入力手段36は1 台のカメラで構成している。37はカメラコントローラーであり、観察者映像入力手段36を制御する。38は視点位置／視線方向検出回路であり、観察者映像入力手段36からの信号から観察者の視点位置や視線方向を画像処理により検出する。観察者映像入力手段36、カメラコントローラー37、視点位置／視線方向検出回路38等は観察条件検出手段30の一要素を構成している。

【００７０】本実施形態の作用を説明する。観察者映像入力手段36で撮影された観察者の画像はカメラコントローラ37を介して視点位置／視線方向検出回路38に入力される。視点位置／視線方向検出回路38では、入力された画像から画像処理により観察者の眼の画像を抽出し、観察者の視点位置や視線方向を検出する。

【００７１】実施形態1 で述べた様に、本発明の立体画像表示装置の表示動作はパララックス・バリアの条件式(1)、(2) に基づいて行うので、もし観察者が前後に移動すれば、観察者の位置（観察距離）に応じてディスプレイ1 に表示するストライプ画素の画素間隔（幅）P を変えるとともに、空間光変調素子2 に形成するパララックス・バリアパターンの開口部の幅B'を変えるのが望ましい。

【００７２】ここでは、ディスプレイ1 に画素サイズ0.110mm（横）×0.330mm （縦）の液晶ディスプレイを用い、その3 画素をそれぞれの視差画像のストライプ幅（ストライプ画素の幅）にしたので画素間隔はP=0.110×3= 0.330 mm となる。

【００７３】そして先ず第1 の観察条件として基線長をD=65mm、観察距離をC=1000mmと設定する。これによって空間光変調素子2 の条件は D=5.05mm 、B'=0.3283mm と設定される。なお、観察幅の広がりを考慮し多少の微調整を行うのが望ましい。 この位置から観察者が観察距離約1500mmの位置へ移動したとすると、観察条件中の観察距離がC=1500mmと変わり、この場合間隔D が変わらないとするとディスプレイ1 上のストライプ画素の幅P をP=0.220mm 、空間光変調素子2 上のパララックス・バリアパターンの開口部の幅B'をB'=0.2192mm にすれば条件式(1),(2) を満足する。そこでこの場合、ストライプ画像のストライプ画素の幅P をディスプレイ1 の2 画素で表示し、パララックス・バリアパターンの開口部の幅B'を空間光変調素子2 の2 画素で形成すれば良い。

【００７４】このように本実施形態では観察条件検出手段30によって観察者の視点位置を検出し、これからその時々の観察距離C を算出し、これに応じてストライプ画像を構成するストライプ画素の幅P 及び空間光変調素子2 に表示するパララックス・バリアパターンの開口部の幅B'（及び遮光部の幅）を適宜制御することにより広い範囲の観察位置にわたって良好に立体視することができる。

【００７５】なお、本実施形態の観察条件検出手段30としては、２台のカメラを利用したり、観察者の周囲に磁場を形成しておき、観察者の頭部に磁気センサーを装着させ、このセンサーからの出力を用いたり、公知のアイマークカメラ等の視線検出手段を用いることもできる。

【００７６】又、本実施形態に於いても観察条件入力手段9によって観察者が自ら視点位置を入力したり、表示画像を観察しながら観察者が調整スイッチ等を制御してディスプレイ1上で立体画像を表示しているストライプ画像の構成要素及び開口パターンの構成要素の少なくとも1つを制御することも出来る。

【００７７】図10は本発明の立体画像表示装置の実施形態4の要部概略図である。本実施形態が実施形態3と異なる点は観察距離Cが変化した場合、実施形態3ではストライプ画素の幅Pとパララックス・バリアパターンの開口部の幅B'を変えて立体画像を観察させたのに対し、本実施形態ではディスプレイ1と空間光変調素子2との間隔Dを変えて立体画像を観察させる点である。その他については同じである。

【００７８】図中、33はディスプレイ1と空間光変調素子2の間隔Dを制御する可変スペーサーであり、信号によってその長さが変化する。34はスペーサー駆動手段であり、画像処理手段3からの信号によって可変スペーサー33を制御する。可変スペーサー33及びスペーサー駆動手段34等は間隔制御手段の一要素を構成している。

【００７９】本実施形態の作用を説明する。本実施形態では観察条件検出手段30によって観察者の視点位置を検出し、これからその時々の観察距離Cを算出し、これに応じてスペーサー駆動手段34を介して可変スペーサー33を制御してディスプレイ1と空間光変調素子2との間隔Dを変えて立体画像を観察させる。

【００８０】その原理について以下に説明する。いま、式(1)、(2)を次の様に書換える：

$C = D\cdot(O+P)/P \equiv k\cdot D$ ----------(3)

$B' = P\cdot(k-1)/k$ ----------(4)

ここで、$k \equiv (O+P)/P$である。

【００８１】これらの式により、ディスプレイ1に表示するストライプ画像11のストライプ画素の幅Pと基線長Oとを決定するとkが決定され、パララックス・バリアパターンの開口部の幅B'は一意的に決定される。又、間隔Dは観察距離Cに比例している。

【００８２】従って、観察距離Cに追従してディスプレイ1とパララックス・バリアパターンを形成している空間光変調素子2との間隔Dを制御することにより、上の条件式を満足できる。

【００８３】例えばストライプ画素の幅P=0.330mm、基線長O=65mmとすれば、k=197.97となり、第1の観察条件である観察距離C=1000mmの位置では間隔D=5.05mm、開口部の幅B'=0.3283mmとすれば良い。そして観察者が第2の観察条件である観察距離C=1500mmの位置へ移動した

場合には、間隔D=7.58mm、開口部の幅B'=0.3283にすれば上の条件式を満足する。

【００８４】また、本実施形態のように視点位置に追従して立体画像を表示する装置において、観察者の横方向への移動に対しては、図11に示す様に観察者の視点位置に応じてパララックス・バリアパターンの開口部を形成する位置を横方向へ適切にずらせばその場合でも立体画像を良好に表示できる。

【００８５】いま、図11(A)に示す様にパララックス・バリアパターンの開口部B'を図中51で示す様に空間光変調素子2の3画素で形成する場合には、図11(B)に示すように視点が横へA'_R,A'_Lの位置に動いた時、パララックス・バリアパターンの開口部をストライプ画像11Aに対して相対的に1画素だけずらして51'で示す様に形成すれば、その場合でもストライプ画像11Aを良好に立体視できる。尚、52や52'は時分割パララックス・バリアパターンの開口部となる場所であることは前述したとおりである。

【００８６】或は、パララックス・バリアパターンの開口部の位置はそのままで、ディスプレイ1に表示するストライプ画像11の位置を横方向へずらしても立体画像を良好に認識できる。

【００８７】後述する実施形態11は以上の方法を採用した実施形態である。

【００８８】図12～14は本発明の立体画像表示装置の実施形態5の説明図である。これまでの実施形態では、ディスプレイ1に表示するストライプ画像を合成するための視差画像R_s,L_sは常に同じであった。即ち観察者は視点位置を変えても、観察している立体画像には何ら変化を生じない、常に同じ立体画像を良好に観察できる立体画像表示方法／装置であった。

【００８９】これに対し、本実施形態では観察者の視点位置変化に応じた画像の回り込み表示を与える表示方法を用いており、観察者の視点位置に応じてディスプレイ1に表示する視差画像R_s,L_sを変化させる点が異なっている。

【００９０】図12は実施形態3又は4の立体画像表示装置のうちのディスプレイ1と空間光変調素子2からなる部分のみを表示装置20として示している。観察者は該表示装置20から観察距離Cだけ離れた位置から画像を観察するものとする。なお、画像処理手段、観察条件検出手段等は省略している。

【００９１】一方、図13は本実施形態の視差画像ソース15の要部概略図である。図中、12は被写体である。K_A、K_B、K_C、K_Dは夫々カメラであり、被写体12から距離Cだけ離れた位置に夫々観察者の両眼間隔（基線長）Oに等しい間隔で横に並べて配置していて、夫々被写体を撮像している。なお、A～Dは各カメラの光学系の前側主点である。又、図14は4台のカメラK_A、K_B、K_C、K_Dが撮像する画像の説明図である。従って本実施形態の場合、視

差画像ソース15は常に4つの原視差画像を有している。

【0092】本実施形態の作用を説明する。いま観察者が図12の位置17（右眼がA_R、左眼がA_L）から位置18（右眼A_R'が位置17における左眼A_Lの位置、左眼がA_L'）を経て、位置19（右眼A_R"が位置18における左眼A_L'の位置、左眼がA_L"）へ移動する場合を考える。

【0093】観察者が位置17にいるときは、表示装置20上に観察者の右眼A_Rが観察する画像R_sとしてカメラK_Aにより点Aから撮像された原視差画像（図14(A)）を表示装置20に入力する。同時に観察者の左眼A_Lで観察する画像L_sとしてカメラK_Bにより点Bから撮影された原視差画像（図14(B)）を表示装置20に入力する。

【0094】そして、表示装置20はディスプレイ1に表示するストライプ画像を合成するための視差画像として上記の図14(A),(B)の2枚の原視差画像を用い、右眼画像としては図14(A)の画像を、左眼画像としては図14(B)の画像を用いてストライプ画像を合成し、表示する。このようにすれば観察者はカメラK_A及びK_Bの位置から被写体を見たときの立体画像を観察する。

【0095】観察者が位置18に移れば、表示装置20上に観察者の右眼A_R'で観察する画像R_sとしてカメラK_Bにより点Bから撮像された原視差画像（図14(B)）を表示装置20に入力する。同時に観察者の左眼A_L'で観察する画像L_sとしてカメラK_Cにより点Cから撮影された原視差画像（図14(C)）を表示装置20に入力する。

【0096】そして、表示装置20はディスプレイ1に表示するストライプ画像を合成するための視差画像として上記の図14(B),(C)の2枚の原視差画像を用い、右眼画像としては図14(B)の画像を、左眼画像としては図14(C)の画像を用いてストライプ画像を合成し、表示する。このようにすれば観察者はカメラK_B及びK_Cの位置から被写体を見たときの立体画像を観察する。

【0097】観察者が位置19に移れば、表示装置20上に観察者の右眼A_R"で観察する画像R_sとしてカメラK_Cにより点Cから撮像された原視差画像（図14(C)）を表示装置20に入力する。同時に観察者の左眼A_L"で観察する画像L_sとしてカメラK_Dにより点Dから撮影された原視差画像（図14(D)）を表示装置20に入力する。

【0098】そして、表示装置20はディスプレイ1に表示するストライプ画像を合成するための視差画像として上記の図14(C),(D)の2枚の原視差画像を用い、右眼画像としては図14(C)の画像を、左眼画像としては図14(D)の画像を用いてストライプ画像を合成し、表示する。このようにすれば観察者はカメラK_C及びK_Dの位置から被写体を見たときの立体画像を観察する。

【0099】以上の動作により、観察者が移動し視点位置を変えると、観察する立体画像は異なる方向から被写体を見た視差画像より構成されたものとなり、被写体12を"回り込んで"見る立体画像を観察することができる。

【0100】本実施形態では視差画像ソース15は4つの原視差画像より成る視差画像情報を有している。そして観察条件検出手段30からの信号により4つの原視差画像より2つの視差画像を選択して使用して立体画像を表示している。

【0101】本実施形態では視差画像ソース15を構成する各々のカメラの前側主点位置A、B、C、Dと各観察位置での各々の眼A_R,A_L(=A_R')、A_L'(=A_R")、A_L"とを一致させているが、例えば観察者の右眼が位置17のA_RとA_Lの間にあり、左眼が位置18のA_R'とA_L'との間にある時、右眼画像R_sとして図14(A)の原視差画像と図14(B)の原視差画像の2枚の原視差画像から画像の「補間」を行って1つの右眼画像（視差画像）R_sを合成し、左眼画像L_sとして図14(B)の原視差画像と図14(C)の原視差画像の2枚の原視差画像から画像の補間を行って1つの左眼画像（視差画像）L_sを合成し、このように新規に合成して作成した2枚の視差画像R,L_sを用いてディスプレイ1に表示するストライプ画像を合成・表示することにより、より滑らかな連続した画像の回り込み効果を実現できる。

【0102】この画像補間の方法としては、従来より公知のエピ・ポーラ・プレーンイメージ（EPI）を用いる方法、すなわち、EPI上で対応点を探索し補間画像を作成する方法（例えば、R.C.Bolles et.al ; Int. J. Computer Vision, Vol.1, No.1, pp.7-55,1987に記載）等を用いることができる。

【0103】この画像補間の手法を用いると、図13に示す4台のカメラシステムで被写体12を撮影しなくても良く、例えば点Aと点Dの位置のカメラで撮影した2枚の原視差画像を用いて画像補間を繰り返し行い、所望の視差画像を形成し、これからストライプ画像を合成することが出来る。（なお、補間によって作成した視差画像を用いて、更に補間によって視差画像を作成することを本発明では「画像の再構成」と呼ぶことにする。）

また、観察者が前後方向に移動した時にも、同様の画像補間を行い、それぞれの視点位置に応じた視差画像を形成して、これからストライプ画像を合成することも可能であり、これらの画像処理の方法としては本出願人が特開平7-129792号公報で開示している方法を用いるとより効果的である。

【0104】又、実施形態5では、表示する画像として4台のカメラで撮影する自然画像を用いているが、CADなどのコンピュータで作成された所謂CG画像などの3次元画像を利用する事もできる。この場合は被写体の「データ」が既に3次元データであるので、任意の位置から見た視差画像を自由に「生成」することができ、それぞれの視点位置に対応した複数の視差画像を生成して、これよりストライプ画像を合成・表示すれば良い。

【0105】従来、視域を広くしたり"回り込み効果"を与えたりするために、パララックス・バリア法を用い

て多像表示（パララックス・パノラマグラムと呼ばれる）を行えば、その時用いる視差画像の数をnとするとディスプレイの解像度をn分の1に低下していた。

【0106】これに対し、本実施形態では解像度の低下は少なくとも2分の1である。更に、本実施形態は実施形態3又は4の構成を用いているので解像度の低下を防止しており、更に実施形態2の構成を採用すれば画像の輝度も向上させられる。

【0107】図15は本発明の立体画像表示装置の実施形態6の立体画像表示方法の説明図である。本実施形態の構成は実施形態1と同じであるが、実施形態1がディスプレイ1への画像表示と空間光変調素子2へのパララックス・バリアパターンの表示を走査線上の各画素毎に同期して表示していたのに対して、本実施形態では走査線毎に同期して表示する点が異なっている。

【0108】図15(A)は実施形態1の図2に示した表示状態と同じ表示状態である。この状態で観察者は空間光変調素子2に形成された第1のパララックス・バリアパターン2_Aを介して第1のストライプ画像11_Aを視ることにより、左右の眼で左右の眼に対応した視差画像を観察して立体視を行なうことができる。

【0109】また本実施形態は図15(B)の状態で第2のパララックス・バリアパターン2_Bを介して第2のストライプ画像11_Bを視ることにより、の立体視を行うことができる。本実施形態ではディスプレイ1に表示するストライプ画像11と空間光変調素子2に形成されたパララックス・バリアパターンの光透過部とを走査線毎に同期させて表示を行い、且つ図15(A)に示す状態と図15(B)に示す状態と2つの表示状態を交互に繰り返し表示する。

【0110】つまり、ある時刻において（図15(A)の表示状態の時）、ディスプレイ1の或る走査線上に視差画像R_6及びL_5のストライプ画素R_1,L_1を$R_1L_2R_3L_4$‥‥と並べた第1のストライプ画像11_Aの該当部分を表示し、同時に空間光変調素子2の対応走査線上には点Gより開（光遮光部）・開（光透過部）・開・開‥‥の順番で光透過部と光遮光部とを繰り返して表示して第1のパララックス・バリアパターン2_Aを形成する。この時右眼A_Rにはストライプ画素$R_1R_2R_3$‥‥で構成された右眼画像のみが入射し、左眼A_Lにはストライプ画素$L_1L_2L_3$‥‥で構成された左眼画像のみが入射し、立体視することができる。（ただし、右眼画像、左眼画像は夫々ディスプレイ1の表示面の解像度の1/2である。）

1フレーム走査し終わって再度上記と同一の走査線を走査している時刻において（図15(B)の表示状態の時）、ディスプレイ1の該走査線上には視差画像R_6及びL_5のストライプ画素R_1,L_1を$L_1R_2L_3R_4$‥‥と並べた第2のストライプ画像11_Bを表示し、同時に空間光変調素子2の対応走査線上には点Gより開・開・開・開‥‥の順番で光透過部と光遮光部とを繰り返して第2のパララックス・バリアパターン2_Bを形成する（この第2のパララックス・バリアパターン2_Bと第1のパララックス・バリアパターン2_Aとでは互いに光透過部と光遮光部とが逆の関係にある）。この時右眼A_Rにはストライプ画素$R_2R_4R_6$‥‥で構成された右眼用の視差画像のみが入射し、左眼A_Lにはストライプ画素$L_1L_3L_5$‥‥で構成された左眼用の視差画像のみが入射し、同様に立体視することができる。

【0111】この2つの表示状態を高速のフレームレートで交互に時分割で表示することで、右眼ではストライプ画素$R_1R_2R_3R_4$‥‥で構成された視差画像R_6すべてが、左眼ではストライプ画素$L_1L_2L_3L_4$‥‥で構成された視差画像L_5すべてがそれぞれ観察され、ディスプレイ1の表示解像度を落とさずに高画質の立体画像が観察できる。

【0112】従来の立体画像表示方法においては、左右の眼から見える画像の解像方は使用するディスプレイの表示解像度の1/2に低下していたが、本実施形態ではそれに対して2倍の高精細画像となっている。

【0113】図16によって本実施形態のディスプレイ1と空間光変調素子2の表示の切り換えを更に詳しく説明する。ここでは図3に示した回路構成を用いてノーインターレースで駆動している場合を示している。図中、左の図がディスプレイ1の表示状態を示し、右の図は空間光変調素子2に表示するパララックス・バリアパターンを示している。

【0114】図16(A)、(C)は、それぞれディスプレイ1の画面が第1のストライプ画像11_A及び第2のストライプ画像11_Bに完全に切り換わった状態を示し、図16(B)はその中間の走査を行っている時、第5走査線Y5を走査し終わった時刻の表示状態を図示している。

【0115】図16(A)に示す様に、ある時刻において（全画面の走査が終わった時刻）、ディスプレイ1には、$R_1L_2R_3L_4$‥‥と並んだ第1のストライプ画像11_Aが全面にわたって表示され、空間光変調素子2には閉開閉開・・・とストライプ状のパターンが並んだ第1のパララックス・バリアパターン2_Aが表示されている。

【0116】そして、この状態から次に第1走査線Y1を選択し、このディスプレイ1の走査線Y1上に$L_1R_2L_3R_4$‥‥と並んだ第2のストライプ画像の該当部分を表示するとともに、空間光変調素子2の走査線Y1上に開閉開閉・・・と並んだ第2のパララックス・バリア・パターン2_Bの該当部分を走査線に同期して表示する。これを走査線Y1、Y2‥‥と順次繰り返し、第5走査線Y5を走査し終わった時刻の表示状態が図16(B)の状態である。

【0117】本実施形態では、この様にディスプレイ1と空間光変調素子2の走査線毎に同期をとって駆動表示する。そして、全走査線を表示し終わった状態が図16(C)であり、ディスプレイ1には図16(A)に示す第1のストライプ画像11_Aとは互いに補完しあう第2のストライプ画像11_Bを表示している。そして図16(A)で右視差画像R_6の奇数番目のストライプ画素R_1,R_3,R_5‥‥を表示していたのに対して、図16(C)では右視差画像R_6の偶数

番眼のストライプ画素R_2、R_4、R_6・・・・を表示している。又、図15(A)で左視差画像L_5の偶数番目のストライプ画素L_2、L_4、L_6・・・・を表示していたのに対して、図16(C)の状態では左視差画像L_5の奇数番目のストライプ画素L_1、L_3、L_5・・・・を表示している。

【0118】これにより一連の走査（全走査線の書換え表示）が終了するとディスプレイ1を構成する全画素に右視差画像R_5および左視差画像L_5が表示されたことになる。

【0119】この時空間光変調素子2に形成するパララックス・バリアパターンも各走査線毎に同期を取って切り換えて表示しているから、この空間光変調素子2を介して、書換え中及び書換え後のストライプ画像を観察したとしても、パララックス・バリア法の原理に基づいてクロストークを殆ど生じることなく立体視することができ、ディスプレイの全画素に表示された高精細な立体画像を見ることができる。

【0120】本実施形態においては、ディスプレイ1の1画素に左右視差画像を構成するストライプ画素の表示幅Pを一致させ、しかも空間光変調素子2の表示面の1画素をパララックス・バリアパターンの光透過部・光遮光部の表示幅に対応させていたが、パララックス・バリアパターンの形成はこれに限られるものではなく、例えば図17に示す様にストライプ画素の表示幅Pをディスプレイ1の複数の画素に対応させることも、パララックス・バリアパターンの光透過部・光遮光部の表示幅B'を空間光変調素子2の複数の画素幅に対応させることもできる。そしてこれは互いに独立に選ぶことができ、ストライプ画素の表示幅Pをディスプレイ1の1画素の幅にしてパララックス・バリアパターンの光透過部・光遮光部の表示幅B'を空間光変調素子2の複数の画素幅に対応させることもできる。このことは本発明のすべての実施形態に適用できる。

【0121】図18は本発明の立体画像表示装置の実施形態7の立体画像表示方法の説明図である。本実施形態の装置の構成は基本的に実施形態6と同じである。ただし、実施形態6においてはディスプレイ1の全面にストライプ画像11_A又は11_Bを表示するとともに、走査線同期により空間光変調素子2の表示面の全面にパララックス・バリアパターン2_A又は2_Bを形成することによりディスプレイ1の表示面全面にわたって立体画像を表示していた。これに対し、本実施形態はコンピュータのウインドウを開く様に、ディスプレイ1の表示面上の一部分にのみ立体画像を表示することができる。この点が実施形態6と異なっている。

【0122】本実施形態においては、立体画像表示装置の作動の最初に観察条件入力手段9によって図18の左の図に示す様にディスプレイ1の表示面上で立体画像を表示する範囲（領域）41を入力する。そして、その領域にのみストライプ画像を表示し、その他の領域には2次元画像（非ストライプ画像）を表示する。同時に空間光変調素子2上のディスプレイ1の領域41に対応する領域42にのみパララックス・バリアパターンを形成し、その他の領域は透光状態にする。これによって所望の領域41にのみストライプ画像から立体画像が観察され、ストライプ画像が表示されていない部分では2次元画像が観察できる。

【0123】この実施形態において、領域41上への立体画像の表示に際しては実施形態6で説明したようにディスプレイ1及び空間光変調素子2の各走査線毎に同期を取って表示を行う。図18では領域41全面にストライプ画素が$L_1R_2L_3R_4L_5R_6$・・と並んだ第2のストライプ画像11_Bを表示した状態から、次の画像表示に移り、第4走査線から順次領域41にストライプ画素が$R_1L_2R_3L_4R_5L_6$・・並んだ第1のストライプ画像11_Aに切り換えて表示し、同時に該走査線に同期して空間光変調素子2の該当部分の光透過部と光遮光部とを切り換えて行き、これを第5走査線Y5まで走査し終わった瞬間を模式的に図示している。

【0124】本実施形態はディスプレイ1の一部分に立体画像を表示して、立体画像と非立体画像の混在表示が行えると共に、ディスプレイ1の領域41に表示するストライプ画像11と空間光変調素子2の領域42に形成するパララックス・バリアパターンとを各走査線毎に同期を取って表示しているので、部分的に表示されたストライプ画像を観察したとしても、パララックス・バリア法の原理に基づいてクロストークを生じることなく立体視することができる。

【0125】本実施形態において、部分的に表示された立体画像の表示領域41の大きさは、ディスプレイ1の表示画面サイズ内であれば良いし、その表示画面上の2次元的な表示位置も表示画面内で適宜選ぶ事ができる。

【0126】なお、ストライプ画素の幅P、数及びディスプレイ1上でストライプ画像を表示する領域等はストライプ画像の構成要素であり、パララックス・バリアパターンの開口部・遮光部の幅B'及び空間光変調素子2上でパララックス・バリアパターンを形成する領域等は開口パターンの構成要素である。

【0127】なお、この場合実施形態1と同じようにディスプレイ1と空間光変調素子2の画素毎に同期を取って駆動することも可能である。

【0128】図19は本発明の立体画像表示装置の実施形態8の立体画像表示方法の説明図である。本実施形態の装置の構成は基本的に実施形態7と同じである。ただし、本実施形態が実施形態7と異なる点は、本実施形態では通常の2次元画像（非ストライプ画像）を表示する領域、即ちディスプレイ1の領域41以外の領域に対してもパララックス・バリアパターンを常に形成する点である。ここでも実施形態7と同様にディスプレイ1の表示面上の領域41にのみ立体画像を表示する場合について説明する。

【０１２９】まず図19(A) を説明する。本実施形態においては、図19(A) の左の図に示す様に、ディスプレイ1には第1 走査線Y1から第3 走査線Y3までは通常の2 次元画像を表示する。この時、図19(A) の右図に示す様に空間光変調素子2 にはディスプレイ1 の各走査線を走査するタイミングに同期を取って、各走査線上の各画素に開閉閉開・・・というストライプ状の第1 のパララックス・バリアパターン2_Aを走査線全体にわたって表示する。

【０１３０】そして、第4 走査線Y4を走査する時にはディスプレイ1 ではディスプレイ1 の第1 画素X_0から第6 画素X_5までストライプ画素RLRLRL・・（実際は$R_1 L_2 R_3 L_4 R_5 L_6$・・であるが先のように略記している）を表示し、第7 画素X_7から第12画素X_{12}までは2 次元画像のこの画素部分に対応する画像を表示する。

【０１３１】そして、空間光変調素子2 ではこのディスプレイ1 の走査線のタイミングに同期を取って、第4 走査線Y4には第1 画素X_0から第12画素X_{12}までの全画素に開閉閉開・・・の第1 のパララックス・バリアパターン2_Aを表示する。 同様の走査・表示を第5 走査線Y5から第8 走査線Y8まで行った状態が図19(A) に図示する状態である。

【０１３２】次に、図19(B) を説明する。図19(A) で第8 走査線Y8までの走査が終わった後、再度第1 走査線Y1から走査する。このとき、第1 走査線Y1から第3 走査線Y3までの走査ではディスプレイ1 には、前と同じく通常の2 次元画像を表示するが、空間光変調素子2 には開閉閉閉・・・の第2 のパララックス・バリアパターン2_Bを走査線全体にわたって表示する。そして、第4 走査線Y4を走査する時には第1画素X_0から第6 画素X_5までストライプ画像LRLRLR・・（実際は$L_1 R_2 L_3 R_4 L_5 R_6$・・であるが先のように略記している）を表示し、第7 画素X_7から第12画素X_{12}までは前記の2 次元画像のこの画素部分に対応する画像を表示する。

【０１３３】そして、このディスプレイ1 の走査線のタイミングに同期を取って、空間光変調素子2 の第4 走査線Y4には第1 画素X_0から第12画素X_{12}までの全画素に開閉閉開・・・の第2 のパララックス・バリアパターン2_Bを表示する。そして同様の走査・表示を第5 走査線Y5まで行った状態が図19(B) に示す状態である。

【０１３４】そして、この走査・表示を繰り返し行って最終走査線Y8を走査・表示し終わった状態が図19(C) に示す状態である。

【０１３５】この立体画像を表示する領域41においては、実施形態1 と同様に一連の走査（全走査線の書換え表示）が終了すると、領域41内の全画素に右視差画像R_5および左視差画像L_5が表示されていることになる。従って本実施形態は立体画像と非立体画像の混在表示が行えると共に立体表示領域41内では左右画像のクロストークの少ない高精細な立体画像を表示することができる。

【０１３６】更に、本実施形態は空間光変調素子2 の全面にパララックス・バリアパターンを表示するので、実施形態7 よりもバリア駆動回路が簡単になる。

【０１３７】これまでの実施形態はノーインターレース駆動の立体画像表示装置であったが、インターレース駆動を用いて本発明の立体画像表示装置を構成することも可能である。

【０１３８】図20は本発明の立体画像表示装置の実施形態9 の立体画像表示方法の説明図である。図20(A)～(D) の夫々左の図はディスプレイ1 の表示状態を、夫々右の図は空間光変調素子2 に形成するパララックス・バリアパターンを示している。本実施形態の構成は基本的に実施形態6 と同じである。本実施形態が実施形態6 と異なる点はインターレース走査を用いて立体画像を表示している点であり、その他は同じである。

【０１３９】図20(A),(D) は、それぞれ実施形態6 の図16(A),(C) の状態と同じである。図20(B) は本実施形態においてディスプレイ1 及び空間光変調素子2 の奇数走査線を走査し終わった状態を示し、図20(C) は偶数走査線のうち2 ライン（走査線Y2とY4）の走査をし終わった状態を示している。

【０１４０】図20(A) に示す様に、ある時刻（全画面の走査が終わった時刻）には、ディスプレイ1 には、ストライプ画素がRLRL・・・・（実際は$R_1 L_2 R_3 L_4$・・であるが先のように略記している）と並んだ第1 のストライプ画像11_Aがディスプレイ1 全面にわたって表示され、空間光変調素子2 には閉開閉開・・・というストライプ状の第1 のパララックス・バリアパターン2_Aが表示されている。

【０１４１】そして、次に奇数走査線、例えば第1 走査線Y1が選択され、ディスプレイ1 の第1 走査線Y1の部分にストライプ画素がLRLR・・・・（実際は$L_1 R_2 L_3 R_4$・・であるが先のように略記している）と並んだ第2 のストライプ画像11_Bの該当部分を表示するとともに、空間光変調素子2 の第1 走査線Y1の部分に開閉閉開・・・・・・と並んだストライプ状の第2 のパララックス・バリアパターン2_Bの該当部分を表示する。この様にディスプレイ1 と空間光変調素子2 の走査線毎に同期をとって駆動表示する。これを奇数走査線に対して順次繰り返し、全走査線を走査し終わった時刻における表示状態を図示したものが図20(B) である。

【０１４２】そして、次に偶数走査線、第2 走査線Y2が選択され、ディスプレイ1 の第2 走査線Y2の部分にストライプ画素がLRLR・・・・と並んだ第2 のストライプ画像11_Bの該当部分を表示するとともに、空間光変調素子2 の第2 走査線Y2の部分に開閉開開・・・・・・と並んだ第2 のパララックス・バリアパターン2_Bの該当部分を表示する。これを偶数走査線に対して順次繰り返し、第4 走査線Y4を走査し終わった時刻の表示状態を図示したものが図20(C) である。

【０１４３】そして、全偶数走査線を走査・表示し終わった状態が図20(D) であり、ディスプレイ1 には図20

(A) に示す第1 のストライプ画像11_A とは互いに補完しあう第2 のストライプ画像11_B を表示している。又、空間光変調素子2 には第2 のパララックス・バリアパターン2_Bを表示している。

【０１４４】これにより一追の走査（全走査線の書換え表示）が終了するとディスプレイ1の全画素に右視差画像R_S および左視差画像L_Sが表示されたことになる。

【０１４５】この時パララックス・バリアパターンも各走査線毎に同期を取って表示していることから、観察者がこのパララックス・バリアパターンを介して、書換中及び書換えられたストライプ画像を観察したとしても、パララックス・バリア法の原理に基づいてクロストークを生じることなく立体視することができ、ディスプレイ1 の全画素に表示された立体画像を見ることができる。

【０１４６】この様に、インターレース駆動を用いて表示すると、奇数走査線と偶数走査線とをフィールド毎に交互に表示することができ、ディスプレイ1 や空間光変調素子2 として、多少表示速度が遅い液晶素子等を用いてもフリッカーのない高精細な立体画像の表示が可能となる。

【０１４７】この表示方法は実施形態7 や実施形態8 で説明した表示装置の画面上の一部分に立体画像を表示する方法へも応用できる。

【０１４８】又、このインターレース駆動は実施形態1 の画素毎に同期を取って表示する方法にも応用できる。

【０１４９】図21は本発明の立体画像表示装置の実施形態10の要部概略図である。又、図22は本実施形態の立体画像表示方法の説明図である。なお、本実施形態のディスプレイ1 及び空間光変調素子2 の配置等は実施形態6 と同じである。又、本実施形態にも実施形態1 と同様に観察条件入力手段9 、視差画像ソース15があるが、図示していない。本実施形態ではディスプレイ1 と空間光変調素子2 の走査線とデータ線の方向をこれまでの実施形態の場合とは90° 回転して設定している。つまり本実施形態では鉛直方向に走査する。

【０１５０】表示方法について説明する。図22(A) に示す様に或る時刻において第1 走査線Y1を選択し、ディスプレイ1 の第1 走査線Y1上の第1 画素X_1から最終画素X_6まで全て右視差画像R_Sのストライプ画素R_Lを表示する。この時空間光変調素子2 には図22(B) に示す様に、空間光変調素子2 の第1 走査線Y1上の第1 画素X_1から最終画素X_6まで光遮光部を形成する。次に、第2 走査線Y2を選択し、ディスプレイ1に第2 走査線Y2上の第1 画素X_1から最終画素X_6まで全て左視差画像L_Sのストライプ画素L_Lを表示し、これに同期して空間光変調素子2 の第2 走査線Y2上の全画素に光透過部を形成する。

【０１５１】同様の駆動を順次行って全ての表示を行う。図22では第7 走査線Y7を走査し終わった状態を示している。

【０１５２】本実施形態ではこの様に、ディスプレイ1 と空間光変調素子2 の各走査線Yi毎に同期を取ってストライプ画像11_A 又は11_B 及びパララックス・バリアパターン2_A又は2_Bを形成することにより、観察者はクロストークの少ない立体画像を見ることができる。

【０１５３】図から明らかな様に、本実施形態の様に縦方向に走査線を設定すると、各走査線に表示するストライプ画像やパララックス・バリアパターンはその走査線上の全画素にわたって、左右の視差画像R_S ,L_S の1 つのストライプ画素R_L若しくはL_L、及び光透過部か光遮光部のどちらかであるので、これまでの実施形態の様に1つの走査線に添ってストライプ画像の該当部分をRLRLRL・・・と交互に配列・表示したり、光遮光部と光透過部とを交互に形成・表示したりする必要がなく、表示回路を簡単にできる。

【０１５４】なお、本実施形態では画像処理手段3 からの同期信号で駆動する場合について示したが、駆動方法についてはディスプレイ駆動回路4 で同期信号を発生させてバリア駆動回路5 の駆動のタイミングを取ったり、Y ドライバーで同期を取る等種々の駆動方法を用いることが出来る。

【０１５５】本実施形態では第1 走査線Y1から順次走査していくノーインターレースと同様の駆動方法を用いているが、奇数走査線を表示してから偶数走査線を表示するインターレースの様な駆動方法を用いることもできる。

【０１５６】図23は本発明の立体画像表示装置の実施形態11の要部概略図である。本実施形態は実施形態6 を発展させたものであり、観察者の視点位置を検出し、観察者の視点位置に応じてパララックス・バリアパターンとディスプレイ1 に表示するストライプ画像との相対的な位置を制御して、広い範囲にわたって立体視できるようにした実施形態である。

【０１５７】図中、30は実施形態3 で説明した観察条件検出手段であり、カメラによって観察者の画像を撮影し、この入力画像から画像処理により観察者の眼の画像を抽出し、観察者の視点位置を検出する。9 は観察条件入力手段であり、場合に応じて観察者の視点位置をマニュアルで入力する。44は画像位置・バリア位置の演算手段であり、観察条件検出手段30又は観察条件入力手段9 からの視点位置情報に基づいてパララックス・バリアパターンとディスプレイ1 に表示するストライプ画像の最適の相対的な位置関係を計算してバリア位置制御回路45及び画像処理手段3 に信号を出力する。バリア位置制御回路45はこの信号に基づいてバリア駆動回路5 を制御して空間光変調素子2 上に適切なパララックス・バリアパターンを形成する。

【０１５８】81、82 は空間光変調素子2 のX ドライバーである。X ドライバー81は奇数画素を駆動し、X ドライバー82は偶数画素を駆動する。

【０１５９】なお、ディスプレイ1 、空間光変調素子2

の配置等は実施形態6と同じである。

【0160】本実施形態の作用を説明する。図23において、観察条件検出手段30或は観察条件入力手段9から観察者の視点位置情報が画像位置・バリア位置の演算手段44へ入力され、画像位置・バリア位置の演算手段44はこの視点位置情報に基づいてディスプレイ1に表示するストライプ画像11及び空間光変調素子2に形成するパララックス・バリアパターンの例えば光透過部の最適の相対的な位置を計算してバリア位置制御回路45及び画像処理手段3に信号を出力し、バリア位置制御回路45はこの信号に基づいてバリア駆動回路5を制御して空間光変調素子2上の最適な位置にパララックス・バリアパターンを形成する。

【0161】同時に画像処理手段3は画像位置・バリア位置の演算手段44からの信号に基づいてディスプレイ1上の最適の位置にストライプ画像を表示する。

【0162】図24はノーインターレースによって駆動している場合のディスプレイ1の表示状態（図24(A)）と空間光変調素子2に形成されるパララックス・バリアパターン（図24(B)）とを示している。

【0163】そして図24(C)は観察者が横方向に移動した場合、その視点位置を検出して空間光変調素子2に形成するパララックス・バリアパターンの位置を横方向へ1画素移動する様に駆動している状態を示している。尚、図24はすべて第5走査線Y5を走査し終わった時刻の表示状態を模式的に表している。

【0164】本実施形態においては、ディスプレイ1に表示する各ストライプ画素の幅Pをディスプレイ1の一画素の幅に設定し、空間光変調素子2に形成されるパララックス・バリアの光透過部または光遮光部の幅B'を空間光変調素子2の2つの画素幅に設定している。

【0165】図25は本実施形態において視点位置の移動に対応してパララックス・バリアパターンを移動する説明図である。図には第1走査線Y1に添ったある部分におけるストライプ画像とパララックス・バリアパターンと観察者の視点位置との関係を示している。

【0166】本実施形態において観察者が移動したとき、ディスプレイ1に表示するストライプ画像を固定して、空間光変調素子2に形成するパララックス・バリアパターンの光透過部の位置を最適な位置に制御する場合について説明する。図25(A)に示す様に、観察者は右眼A_Rで光透過部51を通して右ストライプ画素R_3を見、左眼A_Lで光透過部51を通して左ストライプ画素L_2を見て立体画像を観察している。

【0167】この状態から図25(B)に示す様に観察者の眼が横方向のA'_R,A'_Lへ移動したとする。空間光変調素子2に形成するパララックス・バリアパターンの光透過部51'は空間光変調素子2の一画素の幅Pだけ横方向へ移動して形成する。この走査線の駆動は前記実施形態で説明した様に、ディスプレイ1の走査に同期して駆動を行っている。これによって観察者は右眼A'_Rで光透過部51'を通して右ストライプ画素R_3を見、左眼A'_Lで光透過部51'を通して左ストライプ画素L_2を見て立体画像を観察できる。

【0168】このとき、空間光変調素子2に形成するパララックス・バリアパターンの光透過部または光遮光部を空間光変調素子2の複数の画素で構成していると、パララックス・バリアパターンを微妙に移動することができるので好都合である。

【0169】又、上の説明例とは逆に、視点位置が移動したとき、パララックス・バリアパターンの光透過部の位置はそのままで、ディスプレイ1に表示するストライプ画像の位置を横方向へずらしても良い。この時はディスプレイ1に表示するストライプ画素をディスプレイ1の複数の画素で表示する様に構成していると好都合である。つまり、ディスプレイ1に表示するストライプ画素の表示幅Pをディスプレイ1の複数の画素の幅とするのである。

【0170】以上のように、本実施形態においては観察者の視点が移動しても観察条件検出手段が観察者の視点位置を自動的に検出して、ストライプ画像の表示位置及びパララックス・バリアパターンの形成位置を制御して、常に観察者の視点位置から左右の視差画像を正しく観察するようにしているので立体像を観察できる範囲が極めて広くなる。つまり、本実施形態は観察条件検出手段又は観察条件入力手段からの信号により、ストライプ画像の構成要素及びパララックス・バリアパターンの構成要素の少なくとも1つを制御して観察者の視点位置の移動に追従して立体像を観察できる範囲を移動している。

【0171】なお、観察条件検出手段30としては複数のカメラを用いて三角測量の原理で距離情報を得るとともに、観察者の視点位置を検出する方法を利用することもできる。

【0172】また、観察者の周囲に磁場を形成しておき、観察者の頭部に磁気センサーを装着させ、このセンサーからの出力を用いることも可能である。また、上記の様に観察条件検出手段を設ける以外に、表示画像を観察しながら観察者が調整スイッチ等を制御することも可能である。

【0173】図26は本発明の立体画像表示装置の実施形態12の要部概略図である。装置の構成はディスプレイ1と空間光変調素子2の駆動回路を除いて実施形態6と同じである。なお、観察条件入力手段9、視差画像ソース15は図示していない。本実施形態は実施形態6に対してディスプレイ1と空間光変調素子2のXドライバー、Yドライバーをそれぞれ2個設け、表示画面を2分割して表示駆動する点が異なっている。例えばVGA(640×480画素)の液晶ディスプレイをディスプレイ1及び空間光変調素子2として用いる場合、これらを320本の走査線

に対応するY ドライバー71a 、71b 及び72a 、72b の2つの部分にそれぞれ分割して駆動する。本実施形態ではノーインターレースで駆動しており．図27(A)、(B) は本実施形態のディスプレイ1 と空間光変調素子2 の表示状態を示している。

【０１７４】ある走査時刻において．ディスプレイ1 には画像処理手段3 からの同期信号に基づいて画像信号が入力され、左右の視差画像から作成したストライプ画像を表示する。図27(A) ではY ドライバー71a 、71b の第2 走査線Ya2,Yb2 を走査し終わった状態を図示している。

【０１７５】表示方法について説明する。ある時刻（全画面の走査が終わった時刻）に、ディスプレイ1 の上にストライプ画素が$R_1 L_2 R_3 L_4$・・・・と並んだ第1 のストライプ画像11_A がディスプレイ全面にわたって表示しているとする。再びY ドライバー71a 、71b の第1 走査線Ya1、Yb1 を選択して走査する時には、ストライプ画素が$L_1 R_2 L_3 R_4$・・・・と並んだ第2 のストライプ画像11_B の該当部分を表示する。次いで、第2 走査線Ya2,Yb2 を選択して走査し．第2 のストライプ画像11_B の該当部分を表示する。図27(A) はこの時の状態を図示している。

【０１７６】空間光変調素子2 にも同様にパララックス・バリアパターンを形成する。即ち．ある時刻（全画面の走査が終わった時刻）には、空間光変調素子2 には遮光部と透光部とが閉閉閉開・・・と並んだストライプ状の第1 のパララックス・バリア・パターン2_A を表示している。そして．再びY ドライバー72a 、72b の第1 走査線Ya1,Yb1 が選択されて走査される時には、遮光部と透光部とが閉閉開閉・・・と並んだストライプ状の第2 のパララックス・バリア・パターン11_B を表示する。次いで．第2 走査線Ya2,Yb2 を選択あて走査し、その上に第2 のパララックス・バリア・パターン11_B を表示する。図27(B) はこの時の状態を図示している。

【０１７７】この時、ディスプレイ1 と空間光変調素子2 のY ドライバー71a 、71b 及び72a 、72b の第2 走査線Ya2 、Yb2 は画像処理手段3 によって同期をとって駆動表示する。つまり、本実施形態においては4 本の走査線を同時刻に走査する。その為データ線（X ドライバー）もY ドライバーに対応して、それぞれ2 個設けている。

【０１７８】この様にディスプレイ1 と空間光変調素子2 の表示画面を2 分割して表示駆動することにより、2 倍の駆動スピードで表示を行うことができ、実施形態6 等と比べてさらにフリッカーの少ない立体画像表示が可能となる。

【０１７９】本実施形態では、ディスプレイ1 と空間光変調素子2 の走査線毎に同期をとって駆動表示する場合について説明したが、実施形態1 で用いた1 画素毎に同期をとって駆動表示する方法を用いることも可能である。

【０１８０】図28は本発明の立体画像表示装置の実施形態13の表示状態の説明図である。図28(A)、(B) は．それぞれディスプレイ1 と空間光変調素子2 の表示状態を図示している。本実施形態の構成は基本的に実施形態1 と同じである。ただし、本実施形態ではディスプレイ1 と空間光変調素子2 の1 画素毎に同期をとって駆動表示する際．空間光変調素子2 に光遮光部（閉）を数画素にわたって先行表示させる点が異なっている。

【０１８１】ディスプレイ1 には 図28(A) に示す様に第一走査線Y1に．ストライプ画素が$R_1 L_2 R_3 L_4 R_5 L_6$・・・・（図ではRLRLRL・・・と略記する）と並んだ第1 のストライプ画像11_A の該当部分を表示するとともに、空間光変調素子2 の第1 走査線Y1には図28(B) に示す様に閉閉閉閉閉開・・・と光遮光部と光透過部とを交互に並べた第1 のストライプ・バリアパターン2_A の該当部分を表示する。そして、ノーインターレース駆動の際は、第2 走査線Y2を選択して．第1 走査線と同様に第1 のストライプ画像11_A の該当部分と第1 のパララックス・バリアパターン2_A の該当部分とを表示し、順次これを繰り返し、表示画面全体に第1 のストライプ画像11_A を表示する。これを第1 のパララックス・バリアパターン2_A を介して観察することにより立体画像を観察できる。

【０１８２】図28ではその全走査が終わる途中．第5 走査線Y5を選択し．その第7 画素X_7 の画素データがディスプレイ1 に表示され（図28(A)）、空間光変調素子2 にパララックス・バリアパターンが形成されている（図28(B)）表示状態を模式的に示している。

【０１８３】本実施形態においては．この時図28(B) に示す様に空間光変調素子2 の第5 走査線Y5上で第7 画素X_7 に先行する数画素（ここでは第5 走査線上の第8 画素X_8 ～第10画素X_{10} の3 画素）にわたって光遮光部（閉）を先行表示させており、空間光変調素子2 の第5 走査線Y5の第10画素X10 までの画素データを光遮光部として表示している。

【０１８４】この様にストライプ画像とそれに対応するパララックス・バリアパターンとを1 画素毎に同期をとって駆動表示する際に、数画素（ここでは3 画素）にわたって光遮光部（閉）を先行表示させることにより、左右のストライプ画素のクロストークを一層低減することができる。

【０１８５】特にディスプレイ1 と空間光変調素子2 に異なる特性の液晶パネルを用いた場合．液晶パネルの一走査線の駆動速度が異なっても、左右画像のクロストークを低減することができる。逆に液晶パネルの駆動の点から言えば、それぞれのパネルの同期をとって駆動表示するための駆動マージンを大きくすることができることになる。

【０１８６】もちろん、本実施形態で示した以外に1 走査線毎に同期をとって駆動する実施形態6 等にも応用可能であり、その場合には数走査線にわたって遮光部

（開）を先行表示させれば良い。

【０１８７】図29は本発明の立体画像表示装置の実施形態14の要部概略図である。これまでの実施形態においてはパララックス・バリアを形成している空間光変調素子2をディスプレイ1の前方（観察者側）に配置して立体画像を観察する様に構成していたのに対し、本実施形態では空間光変調素子2をディスプレイ1の後方に配置し、所定の光透過部（開口部）・光遮光部を有する開口パターンを形成してバックライト（光源手段）21からの光の透過部分を制御することにより立体画像を観察する様に装置を構成している点が異なっている。

【０１８８】本装置の構成について説明する。観察者の両眼間隔（基線長）をO、観察距離をC、ディスプレイ1とパララックス・バリアを形成している空間光変調素子2との間隔をD、開口パターンの開口部の幅をB_o。ディスプレイ1に表示するストライプ画像の画素間隔（画素幅）をP_{ccd}とすると、前記実施形態1において説明した数式(1),(2)においてB'をP_{ccd}へ、PをB_oへ置き換えれば良く、以下の関係を満足させれば立体視が得られる。

【０１８９】

$$D=B_o \cdot C/(O+B_o) \quad \text{----------(5)}$$

$$P_{ccd}=B_o \cdot (C-D)/C \quad \text{----------(6)}$$

なお、実際には観察位置において観察幅は有限の広がりをもつので、これらの諸量は若干変更して設定する。

【０１９０】本実施形態の立体画像表示方法について説明する。図29の視差画像ソース15からストライプ画像11_A又は11_Bを形成してディスプレイ1に表示する方法は実施形態1と同じである。一方、画像処理手段3は、上記ストライプ画像データの出力に同期して、開口パターン駆動回路46にも開口パターン2_A又は2_Bの画素データを入力し、空間光変調素子2に開口幅B_oの光遮光部・光透過部を交互に形成したストライプ状の開口パターン2_A又は2_Bを表示する。

【０１９１】バックライト21から射出された光は空間光変調素子2の光透過部を通過し、ディスプレイ1上のストライプ画素R_iを照明し観察者の右眼A_Rに入射する。同様に空間光変調素子2の光透過部を通過したバックライト21からの光はディスプレイ1上のストライプ画素L_iを照明し観察者の左眼A_Lに入射する。これにより観察者はそれぞれの眼でそれぞれの視差画像を観察することとなり、ストライプ画像11を立体視することができる。

【０１９２】このとき、ディスプレイ1と空間光変調素子2の駆動回路として、図3に示した回路構成を用いる。これによりディスプレイ1と空間光変調素子2を1画素毎に同期をとって駆動することができ、ストライプ画像とそれに対応する開口パターンとを常に同期して表示するので、左右の視差画像のクロストークを低減することができる。

【０１９３】もちろん、本実施形態で示した以外に1走査線毎に同期をとって駆動することも可能であり、またこれまでの実施形態で説明した表示方法を用いることができる。

【０１９４】また、図30は本実施形態における立体画像表示装置の斜視図である。本実施形態はカラー表示を行うように構成している。本実施形態においてカラー表示を行うには、それぞれのストライプ画素R_i,L_iをカラーの1画素に対応させれば良い。しかし、公知の縦ストライプのカラーフィルター配列の液晶素子を用いると、観察位置において赤・緑・青に色ズレを生じてしまい、色再現が悪くなる。そこで、本実施形態では、図30の部分拡大図47で示すようにディスプレイ1に用いる透過形の液晶素子の表面に縞方向のストライプ構造を有する赤r・緑g・青bのカラーフィルターを形成して良好な色再現を得ている。

【０１９５】図31は本発明の立体画像表示装置の実施形態15の要部概略図である。本実施形態はこれまでの実施形態に更にリニアフレネルレンズ48を用いて装置を構成したものである。図31(A)、(B)に示す様に、ディスプレイ1と空間光変調素子2の前後関係はどちらでも良く、その作用・表示の原理はこれまでに説明したとうりである。

【０１９６】本実施形態の構成について説明する。これまでの実施形態においては、ディスプレイ1と空間光変調素子2の諸妻素は式(1)、(2)、または式(5)、(6)によって関係づけられ、ディスプレイ1の画素幅と空間光変調素子2の画素幅とは異なっていた。

【０１９７】本実施形態においては水平方向にのみパワーを有する一次元のリニアフレネルレンズ（シリンドリカルフレネルレンズ）を用いることで画素ピッチを調整し、ディスプレイ1と空間光変調素子2に同じ仕様の液晶素子を用いることができるようにしている。立体視の原理及び駆動方法についてはこれまでの実施形態と同様であるので説明は省略する。

【０１９８】図中、48は水平方向にのみパワーを有する一次元のリニアフレネルレンズ（シリンドリカルフレネルレンズ）である。図31(A)に示すようにリニアフレネルレンズ48をパララックス・バリアを形成している空間光変調素子2の前方（観察者側）に設置する場合について説明する。

【０１９９】リニアフレネルレンズ48の焦点距離をf、観察者の両眼間隔（基線長）をO、ディスプレイ1に表示するストライプ画像11の画素間隔（画素幅）をP_{ccd}（これは空間光変調素子2に形成する光透過部・光遮光部の幅と同じである）とすると、ディスプレイ1と空間光変調素子2との間隔d_sは以下の関係を満たせば立体視が得られる。

【０２００】$d_s=P_{ccd}/(O/f)$ ----------(7)

本実施形態においては、ディスプレイ1及び空間光変調素子2として、画素寸法 0.110mm（横）×0.330mm

（縦）の同じ液晶素子を用い、そのカラーの1画素をストライプ画素の幅及び光透過部又は光遮光部の幅としたので P_{LCD}= 0.110 mmとなり、基線長をO=65 mm、観察距離をC=f'=500 mmと設定すれば、d_4= 2.5385 mmの値が得られる。なお、この値は観察幅の広がりを考慮し多少の微調整を行っている。

【０２０１】なお、本実施形態において、ディスプレイ1と空間光変調素子2を1画素毎または1走査線毎に同期をとって駆動することにより、ストライプ画像の表示に際して如何なる時刻においても、ストライプ画像とそれに対応する開口パターンとが常に同期して表示されているので、これまでの実施形態と同様な表示方法を応用でき、又左右の視差画像のクロストークを低減できる。

【０２０２】図32は実施形態15の他の構成例の要部概略図である。本例はリニアフレネルレンズ48をディスプレイ1と空間光変調素子2との間に配置している。

【０２０３】図33は本例の光学配置図である。これによって本構成例の作用を説明する。リニアフレネルレンズ48の主点から第1共役点（ここに観察者の右眼A_R又は左眼A_Lが位置する）までの距離をS、第2共役点までの距離をS'、ディスプレイ1（又は空間光変調素子2）の表示面までの距離をd、空間光変調素子2（又はディスプレイ1）の表示面までの距離をd'とする。いま、S= C（観察距離）= 500 mmとすると、f=250 mm、で d=d' と設定すれば画素幅の同じ液晶素子でディスプレイ1と空間光変調素子2を構成できる。

【０２０４】しかし、本実施形態に用いる液晶素子のカバーガラス厚は偏光板を含めて約1.35mm、リニアフレネルレンズの厚さは2 mmあるから、これらの素子の屈折率を1.5とすれば、空気換算でリニアフレネルレンズの主点と液晶ディスプレイの表示面との間隔は最低2.23 mm必要となる。しかるに本実施形態でも画素寸法0.11 mm×0.33 mmの液晶素子を用い、C=500 mmとすると上記の必要なパネル間隔d_4= 2.5385 mmからd=d'= 2.5385/2= 1.2693 mmとなり、等倍の配置は構成できない。

【０２０５】そこでこの場合、S'とd'とを 2.23/1.2693 = 1.7569倍する。この時、S= 500mm、d= 1.2693mm、S' = 878.45 mm、d'= 2.23 mmとなり、f= 318.6 mmのフレネルレンズを用いれば良い。

【０２０６】本変形例はこの様に構成しているので、ディスプレイ1と空間光変調素子2に同じ仕様の液晶素子を用いることができ、立体画像表示装置のコストを低減できる。

【０２０７】さらにこの場合、図31に示す様にフレネルレンズを装置の前面に配置するのに比べて、目障りなフレネルレンズのギラツキなどを低減できるという効果を有する。

【０２０８】

【発明の効果】本発明は以上の構成により、パララックス・バリア法を用いて、ディスプレイへの画像表示と空間光変調素子への開口パターンの表示を夫々対応する画素毎或は対応する走査線毎に同期して切り換えることにより、左右の視差画像のクロストークが少なく、しかもフリッカー及びモアレ縞が生じ難い優れた立体画像表示方法及びそれを用いた立体画像表示装置を達成する。

【０２０９】その他、

（３－１）第1のストライプ画像と第2のストライプ画像及び第1のパララックス・バリアパターンと第2のパララックス・バリアパターンの切換えを夫々対応する画素毎或は対応する走査線毎に同期して切り換えて、高速で表示することにより、クロストークが極めて少なく、視差画像の夫々をディスプレイの表示面全面に欠落無く高解像度に認識できる。

（３－２）従来の装置では4枚の偏光板を使用しているために、この偏光板の吸収により輝度が低下するという問題があったのに対し、偏光板を1枚削減することができ、表示輝度を向上させることができる。

（３－３）観察者の視点位置を自動的に検出する観察条件検出手段又は観察者が入力する観察条件入力手段からの信号により、ディスプレイに表示するストライプ画素の幅、空間光変調素子に形成する光透過部・光遮光部の幅、或はディスプレイと空間光変調素子の間隔或はストライプ画素と光透過部との相対的位置関係を制御することにより観察者が移動しても常に良好に立体視できる。

（３－４）観察者の視点位置を自動的に検出する観察条件検出手段又は観察者が入力する観察条件入力手段からの信号により、視差画像ソースが有する視差画像情報を構成する3つ以上の原視差画像より2つの視差画像を選択して使用する、若しくは該視差画像情報を構成するデータより2つの視差画像を生成する、若しくは該視差画像情報を構成する少なくとも2つの原視差画像より2つの視差画像を補間又は再構成して作成することにより、観察者が移動した際、それに応じて視点位置の異なる視差画像を適切に構成して、所謂滑らかな『回り込み効果』を与える立体画像を表示する。

（３－５）ディスプレイに表示する2次元画像の中に、クロストークが無く高解像の立体画像を部分的に表示することができる。

（３－６）インターレース駆動を採用することにより、ディスプレイや空間光変調素子として多少表示速度が遅い液晶素子等を用いてもフリッカーの無い高精細な立体画像を表示することができる。

（３－７）ディスプレイ及び空間光変調素子を縦方向に走査線走査して画像を表示するように構成することにより、画面の駆動回路を簡易な構成にできる。

（３－８）ディスプレイ及び空間光変調素子の表示面を走査線に沿って夫々同じ大きさの複数領域に分割し、複数の領域から相対的に同じ位置の走査線を同時に選択して同期して駆動・表示することにより、より短時間で

1画面の表示を行うことが出来、更にフリッカーの少ない立体画像表示表示が可能になる。

（3－9） ディスプレイと空間光変調素子とを1画素毎又は1走査線毎に同期してストライプ画像と開口パターンを表示する際に、該空間光変調素子上の同期して表示する画素に先行する複数画素又は同期して表示する走査線に先行する複数走査線を遮光部として先行して表示させることにより、左右の視差画像のクロストークを一層低減することが出来ると共に、異なる特性の液晶パネルを用いても、クロストークを低減することが出来、夫々のパネルの駆動マージンを大きくすることができる。

（3－10） リニアフレネルレンズを用いることにより、ディスプレイと空間光変調素子を同じ仕様の液晶素子で構成することができ、低コストの立体画像表示装置を達成する。等の少なくとも1つの効果を有する立体画像表示方法及びそれを用いた立体画像表示装置を達成する。

【図面の簡単な説明】

【図1】 本発明の立体画像表示装置の実施形態1の要部概略図

【図2】 実施形態1の立体画像表示方法の説明図

【図3】 実施形態1の駆動方法の説明図

【図4】 実施形態1の表示状態の説明図

【図5】 本発明の立体画像表示装置の実施形態2の要部概略図

【図6】 実施形態2における偏光板の偏光軸の方向と観察画像との関係についての説明図

【図7】 実施形態2における空間光変調素子の他の構成例

【図8】 実施形態2におけるディスプレイの他の構成例

【図9】 本発明の立体画像表示装置の実施形態3の要部概略図

【図10】 本発明の立体画像表示装置の実施形態4の要部概略図

【図11】 実施形態4における開口部の移動の説明図

【図12】 本発明の立体画像表示装置の実施形態5の要部概略図立体画像を観察する説明図

【図13】 実施形態5の視差画像ソースの要部概略図

【図14】 実施形態5の視差画像ソースが有する原視差画像の説明図

【図15】 本発明の立体画像表示装置の実施形態6の立体画像表示方法の説明図

【図16】 実施形態6の表示状態の説明図

【図17】 実施形態6における表示幅の他の選択の説明図

【図18】 本発明の立体画像表示装置の実施形態7の立体画像表示方法の説明図

【図19】 本発明の立体画像表示装置の実施形態8の立体画像表示方法の説明図

【図20】 本発明の立体画像表示装置の実施形態9の立体画像表示方法の説明図

【図21】 本発明の立体画像表示装置の実施形態10の要部概略図

【図22】 実施形態10の立体画像表示方法の説明図

【図23】 本発明の立体画像表示装置の実施形態11の要部概略図

【図24】 実施形態11の表示状態の説明図

【図25】 実施形態11において視点位置の移動に対応してパララックス・バリアパターンを移動する説明図

【図26】 本発明の立体画像表示装置の実施形態12の要部概略図

【図27】 実施形態12の表示状態を説明する図

【図28】 本発明の立体画像表示装置の実施形態13の表示状態の説明図

【図29】 本発明の立体画像表示装置の実施形態14の要部概略図

【図30】 実施形態14の斜視図

【図31】 本発明の立体画像表示装置の実施形態15の要部概略図

【図32】 実施形態15の他の構成例の要部概略図

【図33】 図32の構成例の光学配置図

【図34】 従来の立体画像表示装置

【図35】 従来の立体画像表示装置の構成図

【符号の説明】

1 ディスプレイ

2 空間光変調素子

2_A 第1のパララックス・バリアパターン（開口パターン）

2_B 第2のパララックス・バリアパターン（開口パターン）

3 画像処理手段

4 ディスプレイ駆動回路

5 バリア駆動回路

6,6',6'',81,82 Yドライバー

7,8 Xドライバー

9 観察条件入力手段

11 ストライプ画像（表示画像）

11_A、11_B 第1のストライプ画像、第2のストライプ画像

12 被写体

14 画像位置・バリア位置の演算手段

15 視差画像ソース

16,16' 空間光変調素子の光遮光部

17、18、19 観察位置

20 表示装置

21 バックライト

22、24、26,26' 偏光板

23,25 TN液晶素子（TN液晶セル）

30 観察条件検出手段

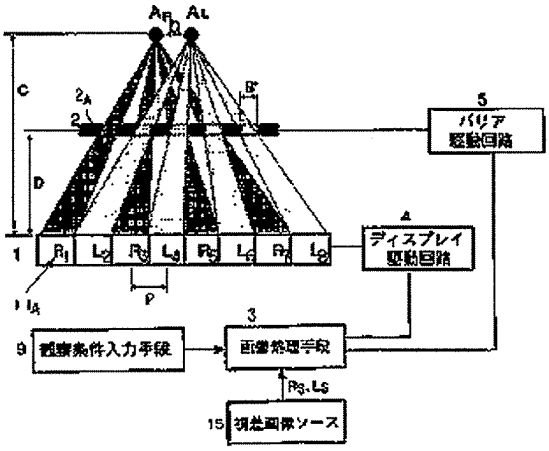
45

33 可変スペーサー
34 スペーサー駆動手段
36 観察者映像入力手段
37 カメラコントローラー
38 視点位置／視線方向検出回路
41 ディスプレイの立体画像表示領域
42 空間光変調素子の立体画像表示領域
44 画像位置・バリア位置の演算手段
46 開口パターン駆動回路
45 バリア位置制御回路
48 リニアフレネルレンズ
51、51' 空間光変調素子の光透過部（開口部）

46

＊ 52、52' 空間光変調素子の光遮光部
A_R、A_L 観察者の右眼、左眼
O 両眼間隔
C 観察距離
D ディスプレイと空間光変調素子との間隔
B'、$B_{n,o}$ 空間光変調素子に形成した開口部の幅
P、P_{rss} ストライプ画素の画素間隔（幅）
R_s、L_s 右、左眼用の視差画像
R_i、L_i 右、左ストライプ画素
10 K_a～K_b カメラ
A～D カメラ光学系の前側主平面
＊ Pb 空間光変調素子の1画素の幅

【図1】



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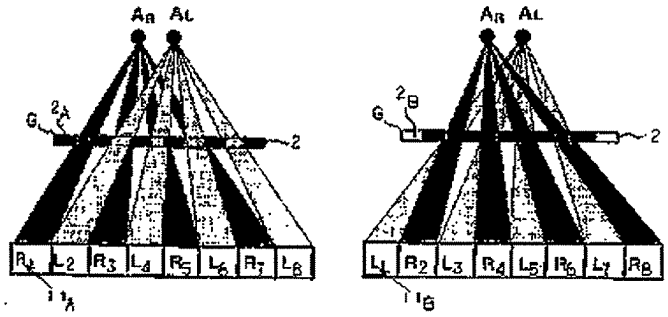

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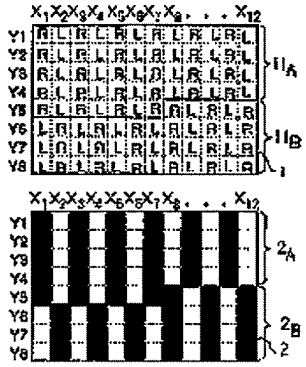

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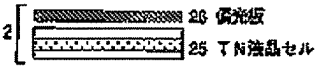

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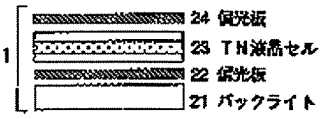

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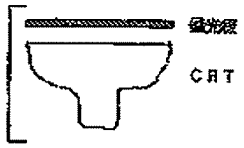

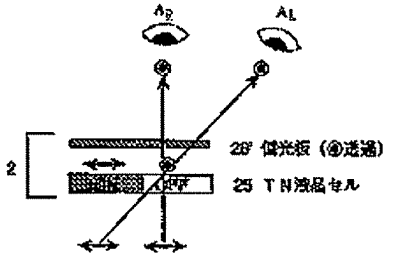

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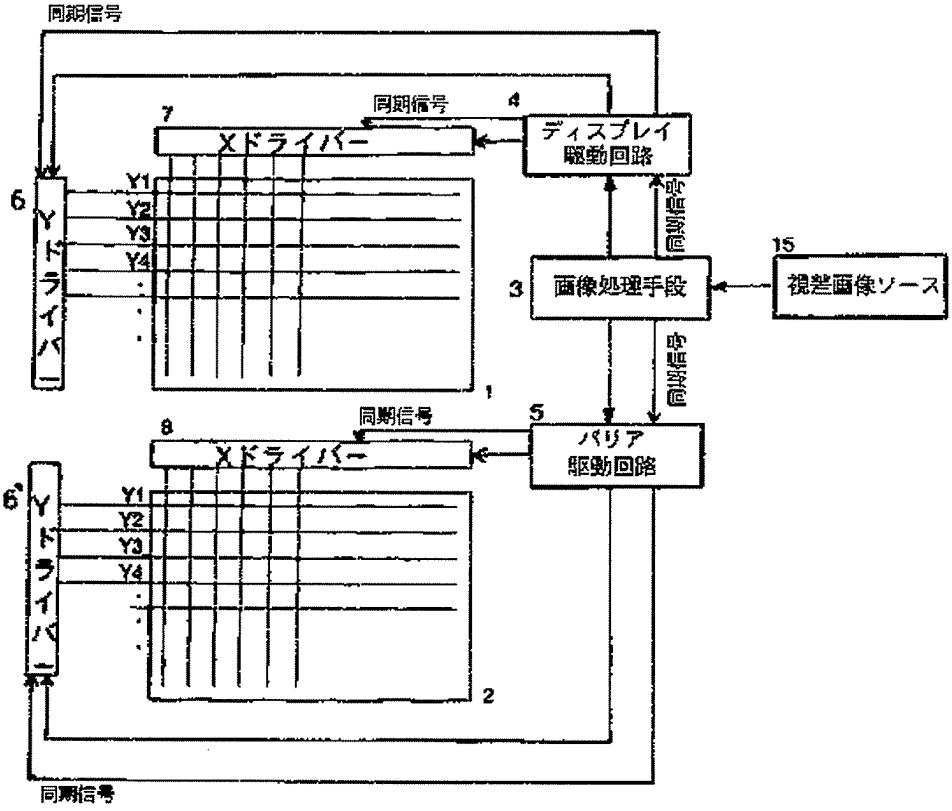
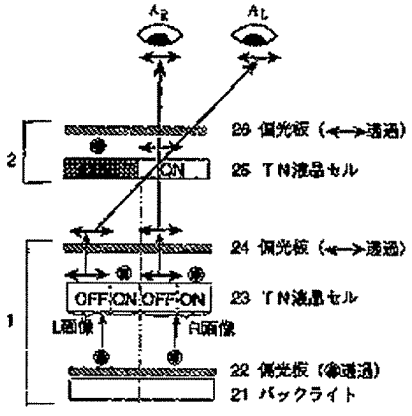
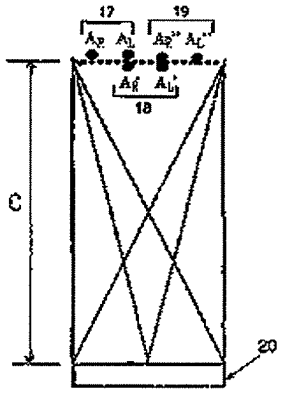

同期信号
7
Xドライバー
同期信号
4
ディスプレイ
駆動回路
6
Yドライバー
Y1
Y2
Y3
Y4
1
3
画像処理手段
15
視差画像ソース
8
Xドライバー
同期信号
5
バリア
駆動回路
6'
Yドライバー
Y1
Y2
Y3
Y4
2
同期信号

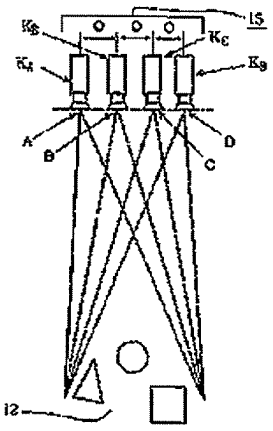
【図6】


26 偏光板（⇔透過）
2
ON
25 TN液晶セル
24 偏光板（⇔透過）
OFF ON OFF ON
23 TN液晶セル
1
L画像
R画像
22 偏光板（⇔透過）
21 バックライト

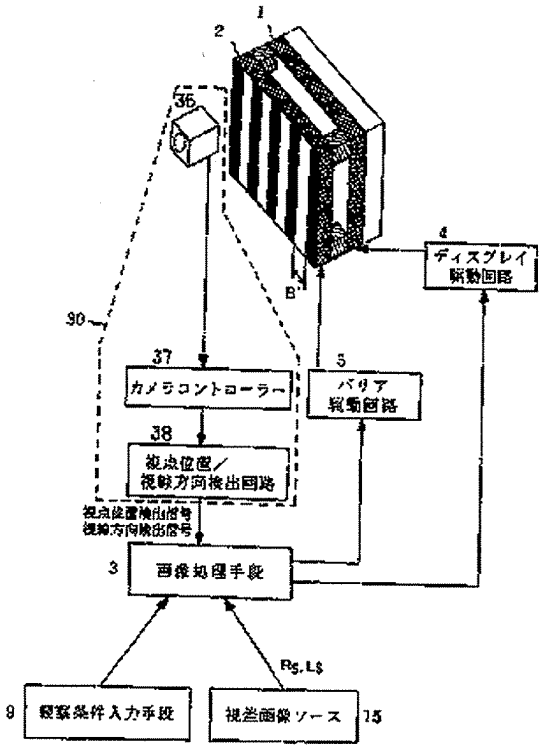
【図12】


17
19
18
C
20

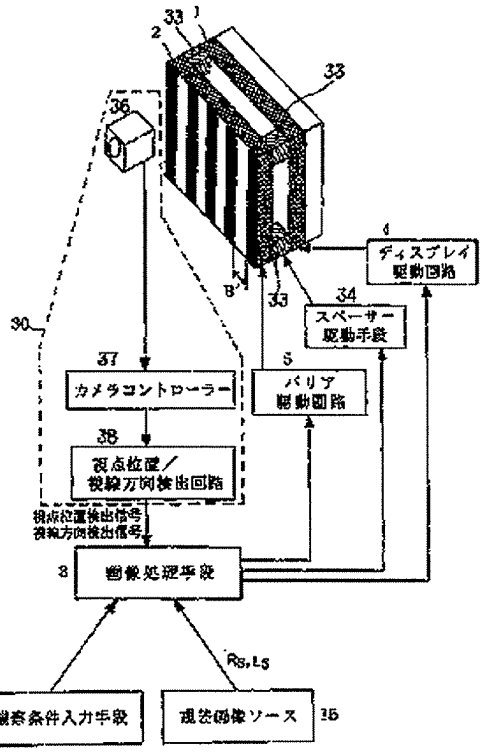
【図13】


15
A
B
C
D
12

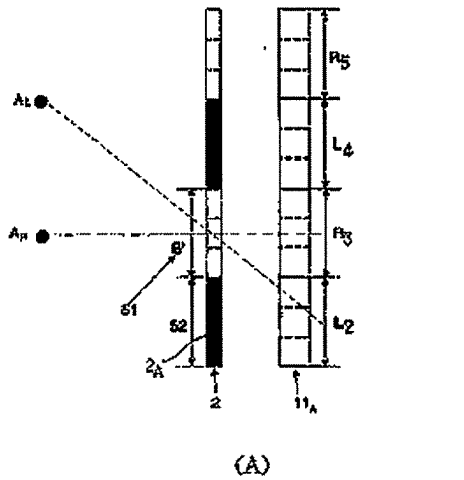
【図９】



【図１０】

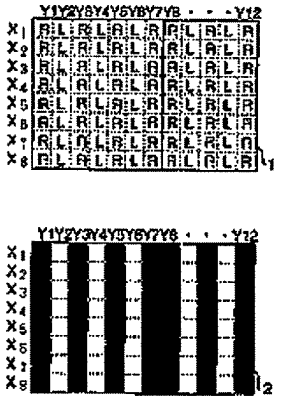


【図１１】

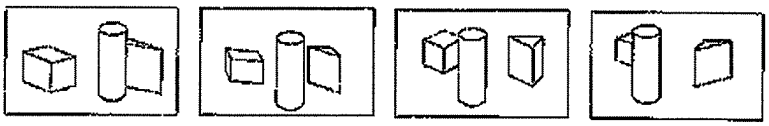


(A) (B)

【図２２】

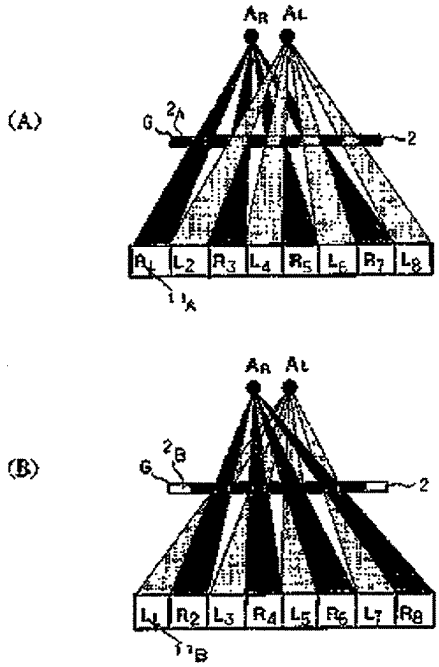


【図１４】

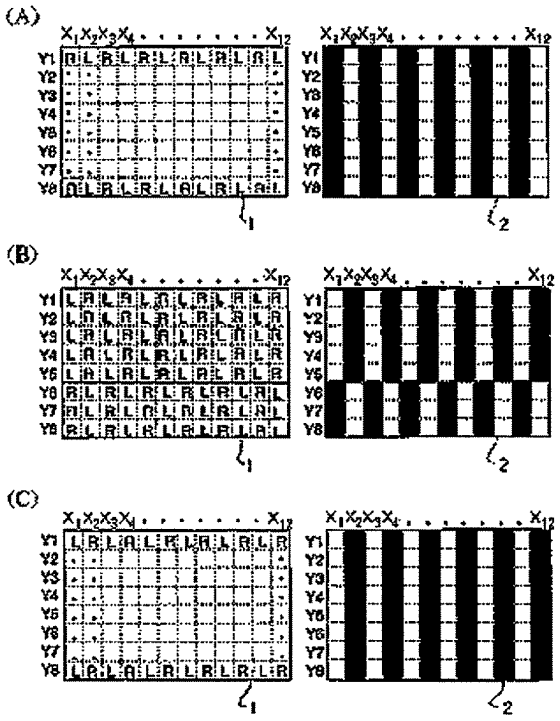


(D) (C) (B) (A)

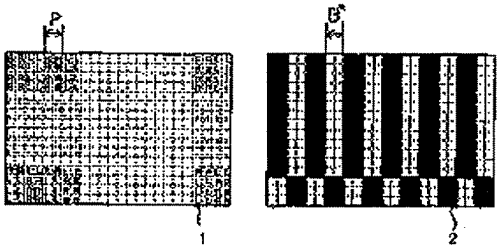
【図１５】



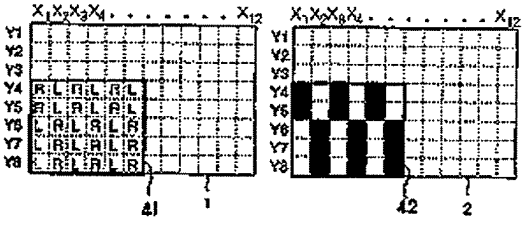
【図１６】



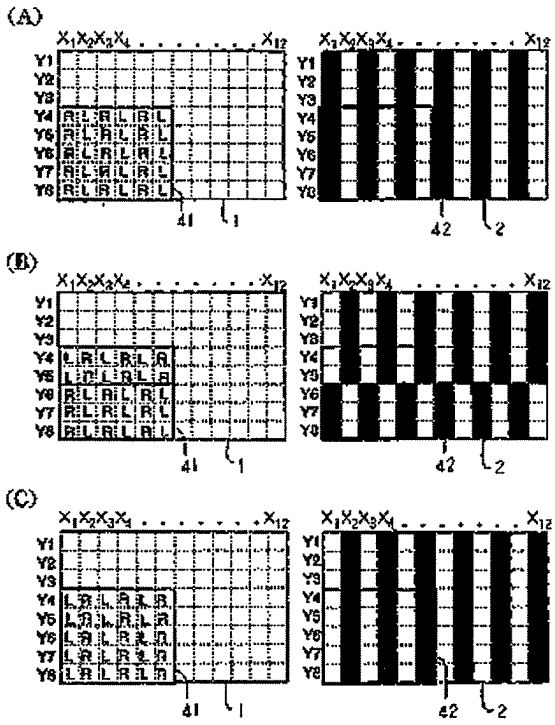
【図１７】



【図１８】



【図１９】



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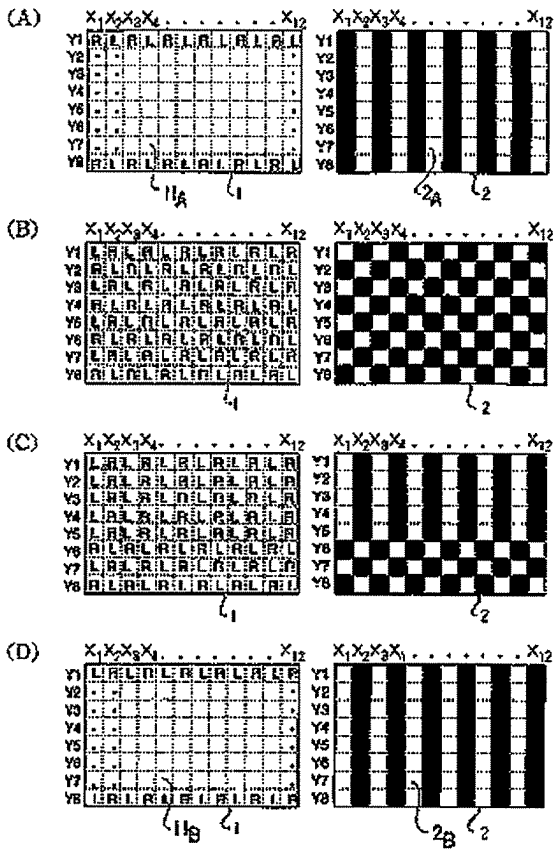
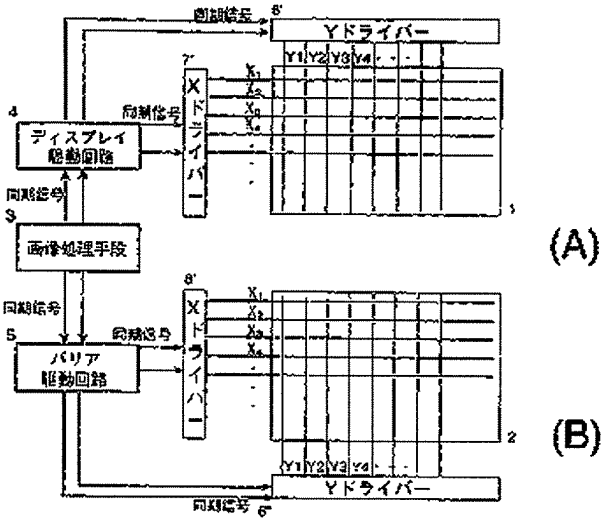


【図２１】



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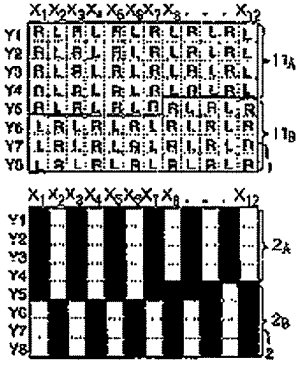
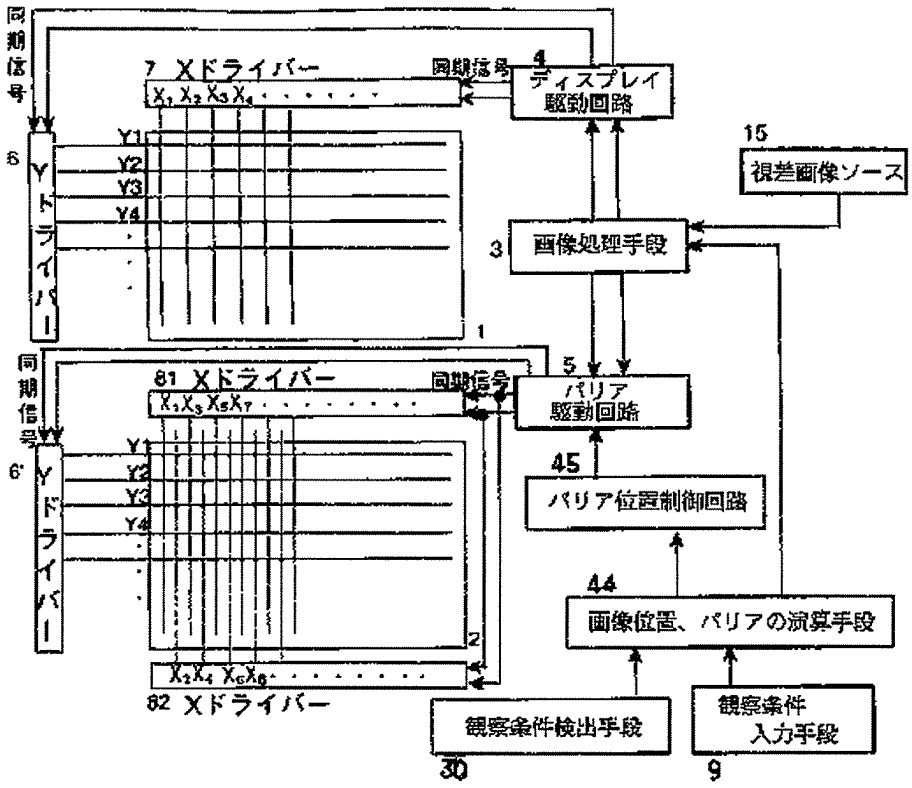
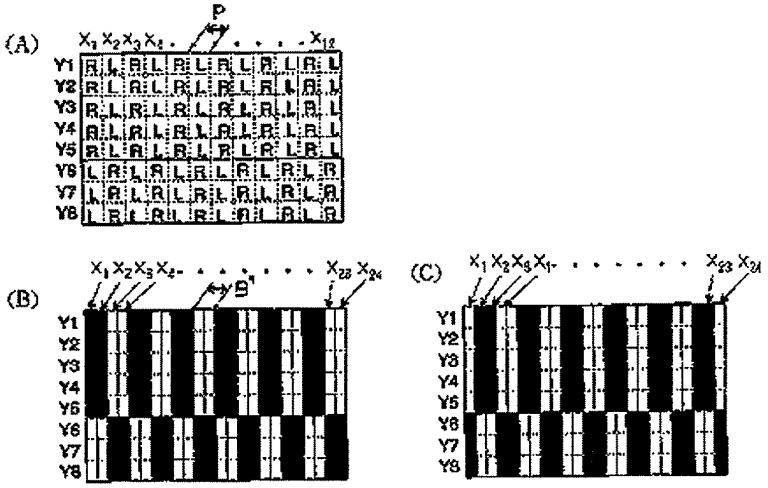


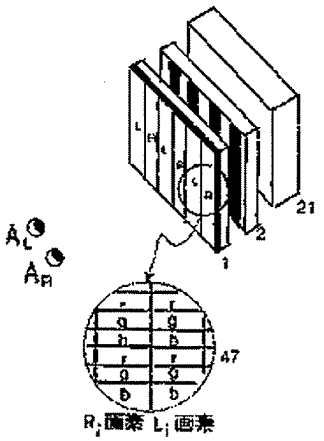
【図２３】


同期信号
7 Xドライバー
同期信号
4
ディスプレイ駆動回路
15
視差画像ソース
6
Yドライバー
3
画像処理手段
1
同期信号
81 Xドライバー
同期信号
5
バリア駆動回路
6'
Yドライバー
45
バリア位置制御回路
44
画像位置、バリアの演算手段
2
82 Xドライバー
観察条件検出手段
30
観察条件入力手段
9

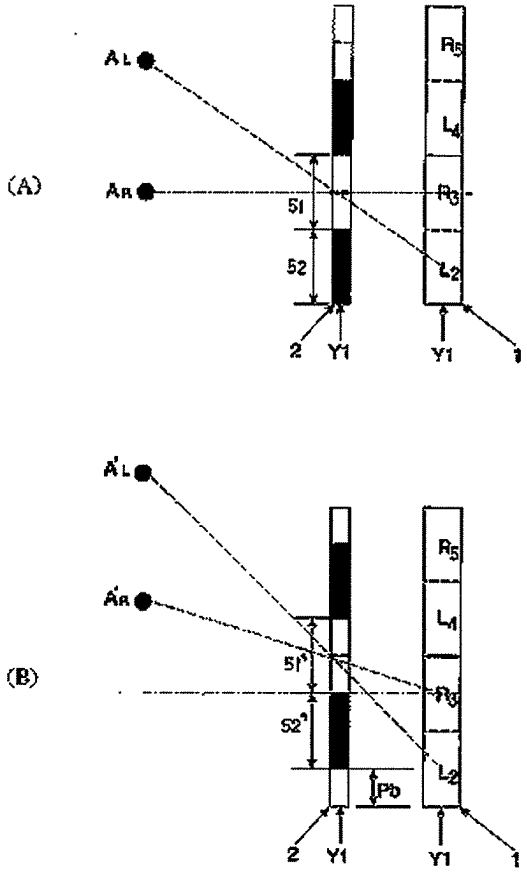
【図２４】


(A)
P
(B)
(C)

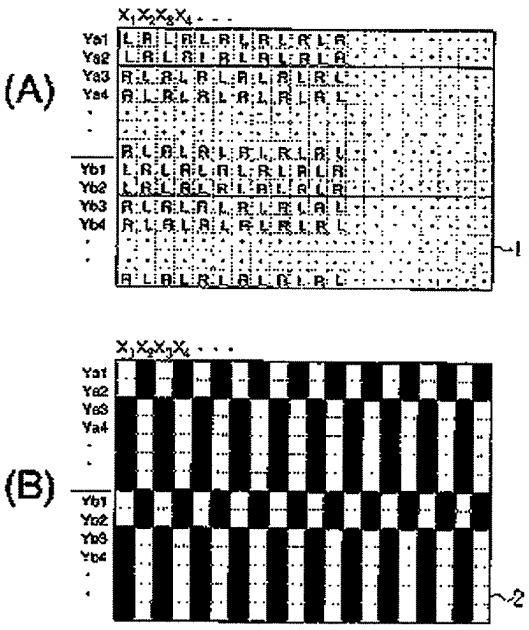
【図３０】


21
2
1
47
R画素 L画素

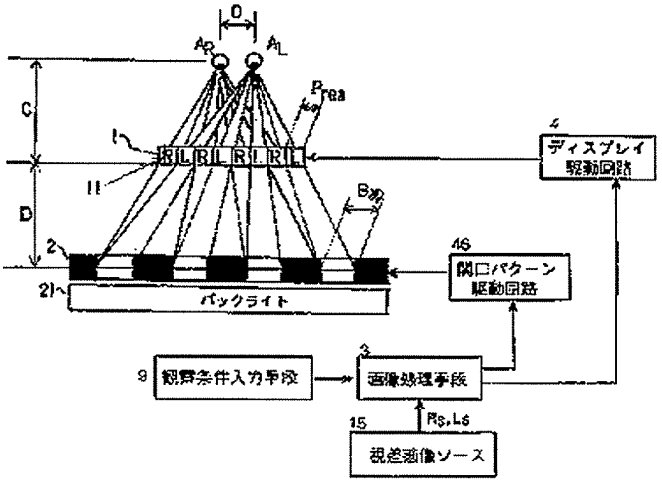
【図25】


(A)
AL
AR
R5
L4
R3
L2
51
52
2
Y1
Y1
1
(B)
A'L
A'R
R5
L4
R3
L2
51'
52'
Pb
2
Y1
Y1
1

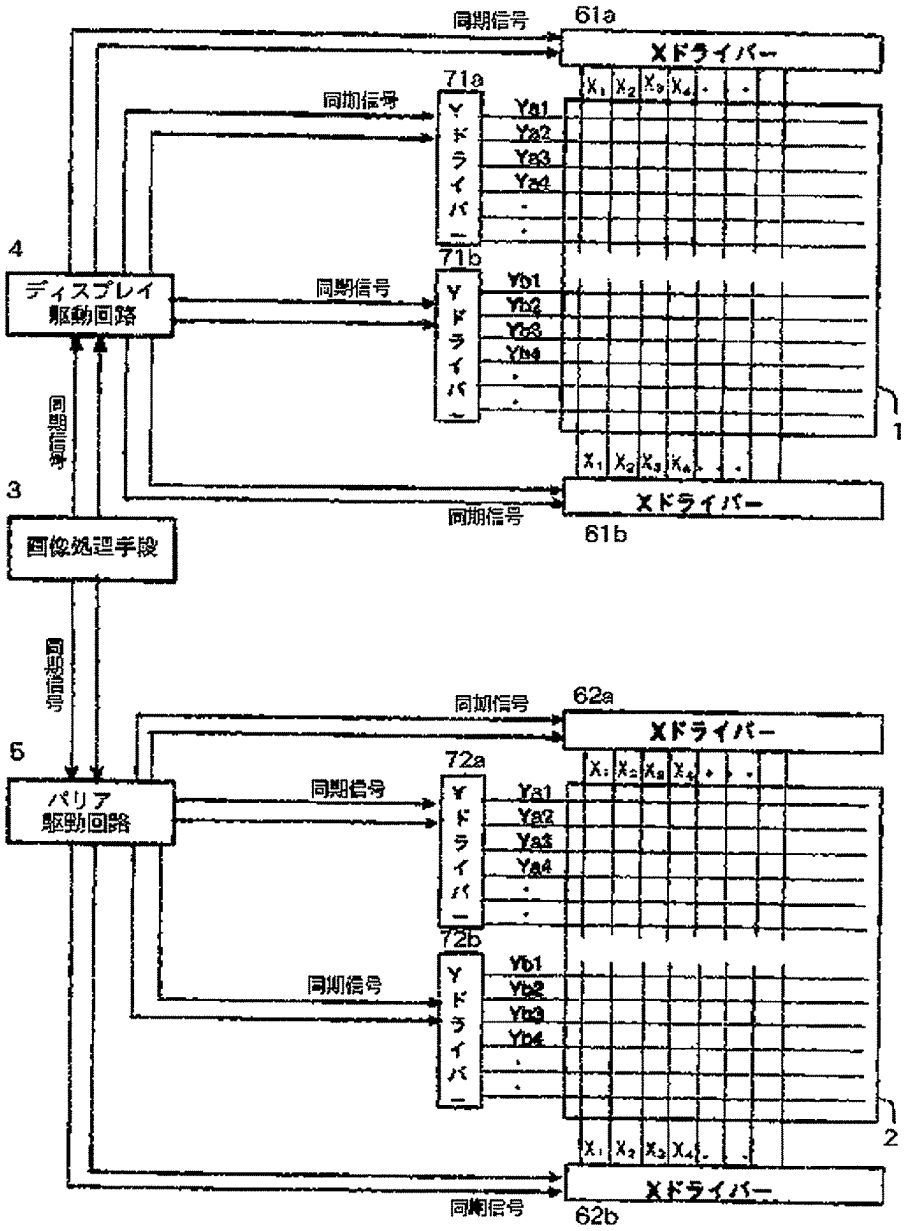
【図27】


(A)
X1X2X3X4・・・
Ya1
Ya2
Ya3
Ya4
Yb1
Yb2
Yb3
Yb4
1
(B)
X1X2X3X4・・・
Ya1
Ya2
Ya3
Ya4
Yb1
Yb2
Yb3
Yb4
2

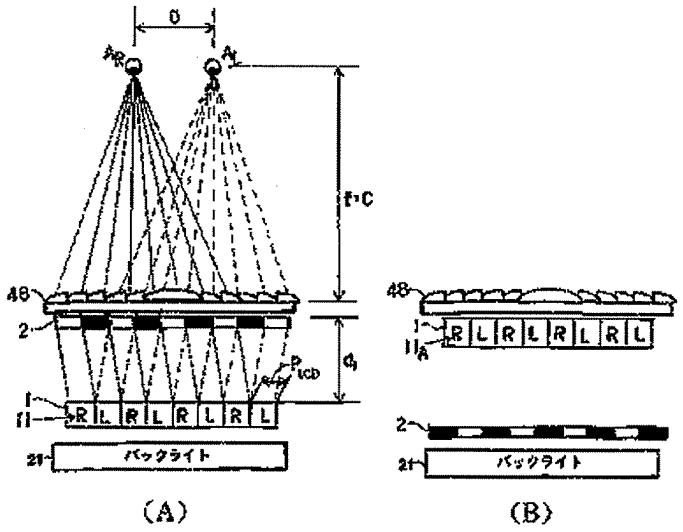
【図29】


D
AR
AL
C
Prea
4
ディスプレイ駆動回路
1
11
Bz
D
2
46
開口パターン駆動回路
21
バックライト
9
観察条件入力手段
3
画像処理手段
15
Ps,Ls
視差画像ソース

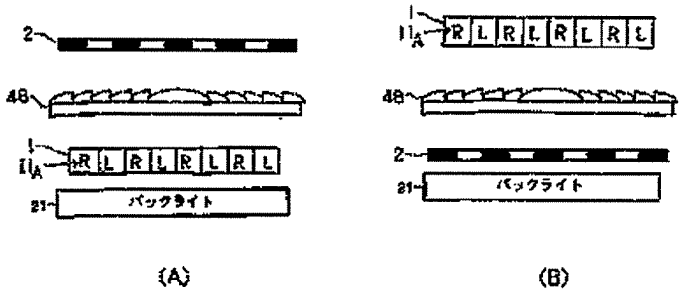
【図26】


同期信号
61a
Xドライバー
71a
Yドライバー
Ya1
Ya2
Ya3
Ya4
71b
Yb1
Yb2
Yb3
Yb4
4
ディスプレイ駆動回路
3
画像処理手段
1
61b
5
パリア駆動回路
62a
72a
72b
2
62b

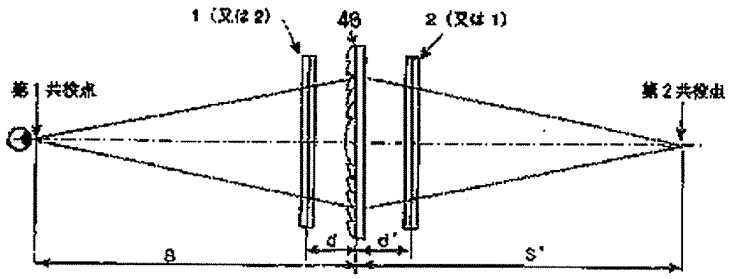
【図３１】


D
f・C
48
2
d
R L R L R L R L
21
バックライト
(A)
(B)

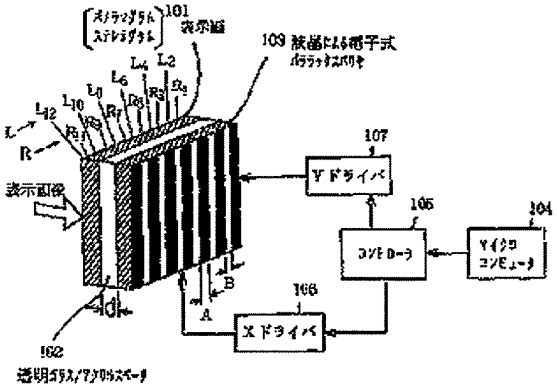
【図３２】


2
48
R L R L R L R L
21
バックライト
(A)
(B)

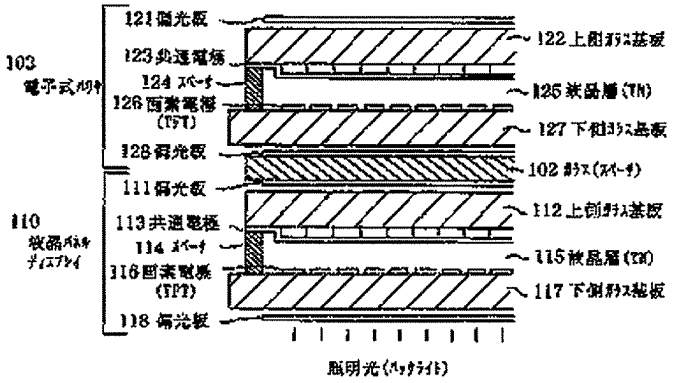
【図３３】


1 (又は 2)
48
2 (又は 1)
第１共役点
第２共役点
S
d
d'
S'

【図３４】



【図３５】



フロントページの続き

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* NOTICES *

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2.**** shows the word which can not be translated.
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CLAIMS

[Claim(s)]
[Claim 1] Each of two or more parallax images from the parallax image source which has parallax image information is divided into a stripe pixel. Arrange these a part of two or more stripe pixels in predetermined sequence, compound one stripe image, and it displays on a display. The opening pattern which consists of the predetermined light transmission section and the optical predetermined protection-from-light section of a pitch on the space light modulation element prepared in the position of the front of this display or back is displayed. When acquiring stereoscopic vision by carrying out incidence of the stripe pixel corresponding to the eye of each right and left of this stripe image to the eye of right and left of an observer by this space light modulation element, respectively, The solid image display approach characterized by synchronizing for every pixel and every scanning line on the scanning line which corresponds and scans this display and this space light modulation element, and displaying this stripe image and this opening pattern.
[Claim 2] The scanning line which corresponds and scans said display and said space light modulation element is the solid image display approach of claim 1 characterized by performing interlace scanning.
[Claim 3] The scanning line which corresponds and scans said display and said space light modulation element is claim 1 or the solid image display approach of 2 characterized by scanning in the direction of a vertical.
[Claim 4] Said two or more parallax images are parallax images on either side. The 1st stripe image which said stripe image arranged by turns the odd-numbered stripe pixel of the stripe pixels into which the parallax image of this right was divided, and the even-numbered stripe pixel of the stripe pixels into which the parallax image of this left was divided, and was compounded, Or it is the 2nd stripe image which arranged by turns the even-numbered stripe pixel of these stripe pixels into which the parallax image of this right was divided, and the odd-numbered stripe pixel of these stripe pixels into which the parallax image of this left was divided, and compounded them. this -- claims 1 and 2 characterized by displaying the stripe image of another side continuously and displaying the opening pattern which switched the light transmission section and the optical protection-from-light section on said space light modulation element in that case after displaying one of the two stripe images on this display, or the solid image display approach of 3.
[Claim 5] Said stripe image is the solid image display approach given in any 1 term of claims 1-4 characterized by displaying on a part of screen of said display, displaying a non-stripe image on the part of the remainder of this screen, displaying an opening pattern on the part corresponding to this stripe image displayed on this display among the screen of said space light modulation element, and changing the part of the remainder in the screen of this space light modulation element into a light transmission condition.
[Claim 6] Said stripe image is the solid image display approach given in any 1 term of claims 1-4 characterized by displaying on a part of screen of said display, displaying a non-stripe image on the part of the remainder of this screen, and displaying an opening pattern on the whole surface at the screen of said space light modulation element.
[Claim 7] The solid image display approach given in any 1 term of claims 1-6 characterized by being two or more width of face of the pixel from which the display width of face of the light transmission section of said opening pattern displayed on the display width of face and/or said space light modulation element of each stripe pixel which constitutes said stripe image displayed on said display, and the optical protection-from-light section constitutes each screen.
[Claim 8] The display width of face of the light transmission section and the optical protection from light section of said opening pattern which the display width of face of each stripe pixel which constitute said stripe image display on said display be 1 pixel in width of face of the pixel which constitute the screen of this display ,

and be display on said space light modulation element be the solid image display approach given in any 1 term of claims 1-6 characterize by to be two or more width of face of the pixel which constitute the screen of this space light modulation element .

[Claim 9] The display width of face of the light transmission section of said opening pattern which the display width of face of each stripe pixel which constitute said stripe image display on said display be two or more width of face of the pixel which constitute the screen of this display , and be display on said space light modulation element , and the optical protection from light section be the solid image display approach given in any 1 term of claims 1-6 characterize by to be width of face of 1 pixel of the pixel which constitute the screen of this space light modulation element .

[Claim 10] The solid image display approach given in any 1 term of claims 1-9 characterized by each screen of said display and said space light modulation element having the pixel of matrix structure.

[Claim 11] It is the solid image display approach given in any 1 term of claims 1-10 characterized by injecting the light which consists of a predetermined polarization light from the stripe image displayed on said display.

[Claim 12] Said space light modulation element is the solid image display approach given in any 1 term of claims 1-11 characterized by constituting from a liquid crystal device.

[Claim 13] The solid image display approach given in any 1 term of claims 1-12 characterize by control at least one of the component of said stripe image , and the components of said opening pattern with the signal from the observation condition input means which the observation condition detection means or observer who detect an observer's view location automatically input .

[Claim 14] The solid image display approach given in any 1 term of claims 1-12 characterized by controlling spacing of said display and said space light modulation element by the spacing control means based on the signal from the observation condition input means which the observation condition detection means or observer who detects an observer's view location automatically inputs.

[Claim 15] The solid image display approach given in any 1 term of claims 1-14 characterized by using it from three or more original parallax images which constitute said parallax image information with the signal from the observation condition input means which the observation condition detection means or observer who detect an observer's view location automatically input , choosing said parallax image .

[Claim 16] With the signal from the observation condition input means which the observation condition detection means or observer who detects an observer's view location automatically inputs According to an observer's view location, generate said parallax image from the data which constitute said parallax image information. Or the solid image display approach given in any 1 term of claims 1-14 characterized by responding to an observer's view location, interpolating or reconfigurating this parallax image and creating it from at least two original parallax images which constitute this parallax image information.

[Claim 17] The solid image-display approach given in any 1 term of claims 1-16 characterized by to precede two or more scanning lines preceded with two or more pixels preceded with the pixel displayed on this space light modulation element synchronizing with the time of synchronizing said display and said space light modulation element for every pixel and every scanning line, and displaying said stripe image and said opening pattern, or the scanning line synchronized and displayed as the protection-from-light section, and to display them.

[Claim 18] The screen of said display and said space light modulation element is divided into two or more fields of the respectively same magnitude along with the scanning line. From these two or more fields, relatively, choose the scanning line of the same location as coincidence, and it is scanned. The solid image display approach given in any 1 term of claims 1-17 characterized by the thing to which every pixel and these two or more scanning lines correspond on these two or more scanning lines on this display and this space light modulation element, and for which it synchronizes for every scanning line and said stripe image and said opening pattern are displayed.

[Claim 19] Each of two or more parallax images from the parallax image source which has parallax image information is divided into a stripe pixel. One stripe image which arranged these a part of two or more stripe pixels in predetermined sequence, and compounded it is displayed on a display. The opening pattern which consists of the predetermined light transmission section and the optical predetermined protection-from-light section of a pitch on the space light modulation element prepared in the position of the front of this display or back is displayed. When acquiring stereoscopic vision by carrying out incidence of the stripe pixel corresponding to the eye of each right and left of this stripe image to the eye of right and left of an observer by this space light modulation element, respectively, The solid image display device characterized by

synchronizing for every pixel and every scanning line on the scanning line which corresponds and scans this display and this space light modulation element, and displaying this stripe image and this opening pattern.
[Claim 20] The scanning line which corresponds and scans said display and said space light modulation element is the solid image display device of claim 19 characterized by performing interlace scanning.
[Claim 21] The scanning line which corresponds and scans said display and said space light modulation element is claim 19 or the solid image display device of 20 characterized by scanning in the direction of a vertical.
[Claim 22] Said two or more parallax images are parallax images on either side. The 1st stripe image which said stripe image arranged by turns the odd-numbered stripe pixel of the stripe pixels into which the parallax image of this right was divided, and the even-numbered stripe pixel of the stripe pixels into which the parallax image of this left was divided, and was compounded, Or the even-numbered stripe pixel of these stripe pixels into which the parallax image of this right was divided, It is the 2nd stripe image which arranged by turns the odd-numbered stripe pixel of these stripe pixels into which the parallax image of this left was divided, and compounded it. As for the opening pattern displayed on the occasion of the display of the 2nd stripe image, the light transmission section and the optical protection-from-light section have a reverse relation mutually. this -- the opening pattern displayed on the occasion of the display of the 1st stripe image -- this -- this -- a solid image display device given in any 1 term of claims 19-21 characterized by displaying two stripe images continuously.
[Claim 23] Said stripe image is a solid image display device given in any 1 term of claims 19-22 characterized by displaying on a part of screen of said display, displaying a non-stripe image on the part of the remainder of this screen, displaying an opening pattern on the part corresponding to this stripe image displayed on this display among the screen of said space light modulation element, and changing the part of the remainder in the screen of this space light modulation element into a light transmission condition.
[Claim 24] Said stripe image is a solid image display device given in any 1 term of claims 19-22 characterized by displaying on a part of screen of said display, displaying a non-stripe image on the part of the remainder of this screen, and displaying an opening pattern on the whole surface at the screen of said space light modulation element.
[Claim 25] A solid image display device given in any 1 term of claims 19-24 characterized by being two or more width of face of the pixel from which the display width of face of the light transmission section of said opening pattern displayed on the display width of face and/or said space light modulation element of each stripe pixel which constitutes said stripe image displayed on said display, and the optical protection-from-light section constitutes each screen.
[Claim 26] The display width of face of the light transmission section of said opening pattern which the display width of face of each stripe pixel which constitutes said stripe image display on said display is 1 pixel in width of face of the pixel which constitutes the screen of this display , and is display on said space light modulation element , and the optical protection-from-light section is a solid image display device given in any 1 term of claims 19-24 characterize by be two or more width of face of the pixel which constitutes the screen of this space light modulation element .
[Claim 27] The display width of face of the light-transmission section and the optical protection-from-light section of said opening pattern which the display width of face of each stripe pixel which constitute said stripe image display on said display be two or more width of face of the pixel which constitute the screen of this display , and be display on said space light modulation element be a solid image display device given in any 1 term of claims 19-24 characterize by to be width of face of 1 pixel of the pixel which constitute the screen of this space light modulation element .
[Claim 28] A solid image display device given in any 1 term of claims 19-27 characterized by each screen of said display and said space light modulation element having the pixel of matrix structure.
[Claim 29] Said space light modulation element is the solid image display device of claims 19-28 characterized by being a liquid crystal device.
[Claim 30] Said space light modulation element is the solid image display device of claim 29 characterized by being a ferroelectric liquid crystal component.
[Claim 31] Said display is claim 29 or the solid image display device of 30 characterized by being a liquid crystal device.
[Claim 32] Said display is the solid image display device of claim 31 characterized by being a ferroelectric liquid crystal component.
[Claim 33] Claim 29 or 30 solid image display devices which are characterized by constituting said display from spontaneous light type television and one polarizing plate.

[Claim 34] It is a solid image display device given in any 1 term of claims 19-33 characterized by injecting the light which consists of a predetermined polarization light, and constituting said space light modulation element from a stripe image displayed on said display with a liquid crystal device and one polarizing plate.
[Claim 35] A solid image display device given in any 1 term of claims 19-34 characterized by controlling at least one of the component of said stripe image, and the components of said opening pattern with the signal from the observation condition input means which the observation condition detection means or observer who detects an observer's view location automatically inputs.
[Claim 36] A solid image display device given in any 1 term of claims 19-34 characterized by controlling spacing of said display and said space light modulation element by the spacing control means based on the signal from the observation condition input means which the observation condition detection means or observer who detects an observer's view location automatically inputs.
[Claim 37] A solid image display device given in any 1 term of claims 19-36 characterized by using it from three or more original parallax images which constitute said parallax image information with the signal from the observation condition input means which the observation condition detection means or observer who detects an observer's view location automatically inputs, choosing said parallax image.
[Claim 38] With the signal from the observation condition input means which the observation condition detection means or observer who detects an observer's view location automatically inputs According to an observer's view location, generate said parallax image from the data which constitute said parallax image information. Or a solid image display device given in any 1 term of claims 19-36 characterized by responding to an observer's view location, interpolating or reconfigurating this parallax image and creating it from at least two original parallax images which constitute this parallax image information.
[Claim 39] A solid image display device given in any 1 term of claims 19-38 characterized by to precede two or more scanning lines preceded with two or more pixels preceded with the pixel displayed on this space light modulation element synchronizing with the time of synchronizing said display and said space light modulation element for every pixel and every scanning line, and displaying said stripe image and said opening pattern, or the scanning line synchronized and displayed as the protection-from-light section, and to display them.
[Claim 40] The screen of said display and said space light modulation element is divided into two or more fields of the respectively same magnitude along with the scanning line. From these two or more fields, relatively, choose the scanning line of the same location as coincidence, and it is scanned. A solid image display device given in any 1 term of claims 19-39 characterized by the thing to which every pixel and these two or more scanning lines correspond on these two or more scanning lines on this display and this space light modulation element, and for which it synchronizes for every scanning line and said stripe image and said opening pattern are displayed.
[Claim 41] The display which carries out sequential formation while scanning one stripe image which divided respectively the parallax image for the right-and-left eyes from the parallax image source into the stripe pixel, arranged this stripe pixel in predetermined sequence, and compounded it, The space light modulation element which the opening pattern which consists the front or behind this display of the predetermined light transmission section and the optical predetermined protection-from-light section of a pitch is synchronized with this scan, and carries out sequential formation is arranged. The solid image display device characterized by carrying out stereoscopic vision by carrying out incidence of the stripe pixel corresponding to the eye of each right and left of this stripe image for the light from this stripe image displayed on this display to the eye of right and left of an observer with this opening pattern, respectively.
[Claim 42] A solid image display device given in any 1 term of claims 19-41 characterized by having the linear Fresnel lens which prepares said space light modulation element ahead of said display, and has chisel power horizontally between the front of this space light modulation element, or this display and this space light modulation element.
[Claim 43] A solid image display device given in any 1 term of claims 19-41 characterized by having the linear Fresnel lens which prepares the space light modulation element illuminated with the light source means behind said display, and has chisel power horizontally between the front of this display, or this display and this space light modulation element.
[Claim 44] The parallax image for the right-and-left eyes from the parallax image source is respectively divided into a stripe pixel. Sequential formation is carried out scanning on a display one stripe image which arranged this stripe pixel in predetermined sequence, and compounded it. The light from this stripe image displayed on this display with the opening pattern which the predetermined light transmission section and the optical

predetermined protection-from-light section of a pitch were synchronized with this scan, and carried out sequential formation on the space light modulation element The solid image display approach characterized by carrying out stereoscopic vision by carrying out incidence of the stripe pixel corresponding to the eye of each right and left of this stripe image to the eye of right and left of an observer, respectively.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the solid image display device using the solid image display approach and it which use especially a space light modulation element as an opening pattern which controls the directivity of the light from a parallax barrier or a back light about the solid image display device which used the solid image display approach and it.
[0002]
[Description of the Prior Art] As for the solid image display method using the parallax barrier method, the technique is indicated by S.H.Kaplan (21 59 "Theory of Parallax Barriers", J.SMPTE, Vol. No. 7, pp.11- 1952). This method divides each of two or more parallax images into a stripe pixel, and is 1. On the screen of **, arrange by turns the stripe pixel which constitutes a parallax image on either side, and a stripe image is formed and displayed. Stereoscopic vision is acquired through the slit (called a parallax barrier) which has the predetermined light transmission section prepared in the location which only a predetermined distance separated from this stripe image by observing the parallax image corresponding to each eye by the eye of each right and left of an observer.
[0003] With such conventional equipment, it is this 2 like the usual television It was not able to be used as a dimension image display device.
[0004] Then, in JP,3-119889,A and JP,5-122733,A, a parallax barrier is electronically formed by a transparency form liquid crystal device etc., and the solid image display device controls a configuration, a location, etc. of a barrier stripe electronically and it was made to change is indicated. Drawing 34 is the important section schematic diagram of the solid image display device currently indicated by JP,3-119889,A. With this equipment, it is the image display side 101. Spacer 102 of thickness d Electronic formula parallax barrier 103 which minds and consists of a transparency form liquid crystal display component It arranges. image display side 101 **** -- 2 Two or more parallax images picturized a direction or from many are divided into a vertical stripe pixel, respectively. It displays as a stripe image which arranged the stripe pixel of two or more of these parallax images in predetermined sequence by turns, and constituted it. on the other hand -- electronic formula parallax barrier 103 **** -- XY address -- microcomputer 104 etc. -- specifying by the control means -- electronic formula parallax barrier 103 A longwise barrier stripe is formed in the location of the arbitration on the screen. According to the principle of said parallax barrier method, stereoscopic vision is made possible.
[0005] It sets to this equipment and is 2. In case a dimension image (non-solid image) display is performed, it is the electronic formula parallax barrier 103. It is 2 by changing into a transparent and colorless condition over the whole region of an image display field, without forming a barrier stripe. Dimension image display is performed. Usual 2 which was not made by the solid image display method using the conventional parallax barrier method by this Coexistence with dimension image display is realized.
[0006] Drawing 35 is the important section schematic diagram of the liquid crystal panel display currently indicated by JP,5-122733,A and the solid image display device constituted by the electronic formula barrier. this solid image display device -- 2 Liquid crystal layers 115 and 125 of ** respectively -- 2 Polarizing plates 111 and 118 of ** 121 and 128 -- inserting -- liquid crystal layer 115 An image display means and liquid crystal layer 125 It is made the configuration made into electronic formula barrier means forming. [and] It also sets to this equipment and is 2. It is 2 by stopping formation of a barrier stripe in the liquid crystal layer 125, and changing into a transparent and colorless condition over the whole region of an image display field, in case dimension image display is performed. Dimension image display is performed and it is usual 2. Coexistence

with a dimension image display device is realized.
[0007]
[Problem(s) to be Solved by the Invention] the conventional example currently indicated by JP,3-119889,A -- image display side 101 **** -- at least 2 the parallax image of ** -- respectively -- a stripe pixel -- dividing -- these [2] the stripe pixel from the parallax image of ** -- alternation -- arranging -- 1 The stripe image of ** was compounded and this was displayed. Therefore, the resolution of an image display device is 1/2 at least to the original parallax image. There was a falling problem.
[0008] Furthermore, at the above-mentioned conventional example, it is the image display side 101. The stripe image and the electronic formula parallax barrier 103 which consist of the stripe pixel of the displayed length Since a synchronization was taken and the parallax barrier pattern to form was not displayed, the cross talk of a right-and-left image occurred, and a flicker may be produced, and it was offensive to the eye.
[0009] Moreover, when there was no view migration of an observer, since the display position of a barrier stripe did not change, it had the problem of producing the fall of the brightness localized in the shape of a stripe.
[0010] Furthermore, since an image display side has [an image display means] stripe-like pixel structure in the case of liquid crystal etc. and this image was observed through the barrier stripe of the shape of same stripe, there was a problem of being easy to produce a Moire fringe.
[0011] Furthermore, at the conventional example indicated by JP,5-122733,A, it is 4 with the whole equipment. Since the polarizing plate of ** was used, there was a problem that brightness fell by this absorption.
[0012] In addition, in these conventional examples, although reverse stereoscopic vision was prevented by replacing the display position of the right eye image of a stripe image, and a left eye image when an observer moved only both-eyes spacing (base length) to a longitudinal direction, there was a problem that it could not respond in change of the view location of order.
[0013] Furthermore, in the conventional example, there was a problem that the "surroundings lump stereoscopic vision effectiveness" that the solid image currently observed is always the same, and a smooth cubic effect can be acquired only by making it follow so that a right parallax image may always carry out incidence to an eye according to view location change of an observer in order to prevent reverse stereoscopic vision was not acquired.
[0014] By switching the image display to a display, and the display of the opening pattern to a space light modulation element synchronously for every pixel which corresponds, respectively, and every corresponding scanning line using the parallax barrier method, the purpose of this invention has few cross talks of a parallax image on either side, and is offer of the solid image display device using the outstanding solid image display approach and outstanding it which a flicker and a Moire fringe moreover cannot produce easily.
[0015] In addition to this (1-1) The 1st A stripe image and the 2nd A stripe image and the 1st A parallax barrier pattern and the 2nd By switching the change of a parallax barrier pattern synchronously for every pixel which corresponds, respectively, and every corresponding scanning line, and displaying it at high speed, there are very few cross talks and they can recognize each of a parallax image to high resolution without lack on the whole screen surface of a display.
(1-2) With conventional equipment, since four polarizing plates are used, to there having been a problem that brightness fell by absorption of this polarizing plate, one polarizing plate can be reduced and display brightness can be raised.
(1-3) even if an observer move by control the width of face of the stripe pixel display on a display , the width of face of the light transmission section and the optical protection from light section form in a space light modulation element , spacing of a display and a space light modulation element , or the relative location of a stripe pixel and the light transmission section , with the signal from the observation condition input means which the observation condition detection means or the observer who detect an observer view location automatically input , stereoscopic vision can always carry out good .
(1-4) With the signal from the observation condition input means which the observation condition detection means or observer who detects an observer's view location automatically inputs Use it from three or more original parallax images which constitute the parallax image information which the parallax image source has, choosing two parallax images. Or by generating two parallax images from the data which constitute this parallax image information, or interpolating or reconfigurating and creating two parallax images from at least two original parallax images which constitute this parallax image information When an observer moves, the parallax image with which view locations differ according to it is constituted appropriately, and the solid image

which gives the so-called smooth "surroundings lump effectiveness" is displayed.
(1-5) Into the two-dimensional image displayed on a display, there is no cross talk and the solid image of high resolving can be displayed partially.
(1-6) By adopting an interlace drive, even if a display speed uses a late liquid crystal device etc. somewhat as a display or a space light modulation element, a high definition solid image without a flicker can be displayed.
(1-7) By constituting so that the scanning-line scan of a display and the space light modulation element may be carried out in a lengthwise direction and an image may be displayed, the drive circuit of a screen is made to a simple configuration.
(1-8) The screen of a display and a space light modulation element is divided into two or more fields of the respectively same magnitude along with the scanning line, from two or more fields, the scanning line of the same location is relatively chosen as coincidence, and it synchronizes, and a drive and by displaying, one screen can be displayed more in a short time, and the solid image display display with still few flickers is attained.
(1-9) In case a display and a space light modulation element are synchronized for every pixel and every scanning line and a stripe image and an opening pattern are displayed By preceding two or more scanning lines preceded with two or more pixels preceded with the pixel synchronized and displayed or the scanning line synchronized and displayed on this space light modulation element as the protection-from-light section, and displaying them While being able to reduce further the cross talk of a parallax image on either side, even if it uses the liquid crystal panel of a different property, a cross talk can be reduced and the drive margin of each panel can be enlarged.
(1-10) By using a linear Fresnel lens, a display and a space light modulation element can be constituted from a liquid crystal device of the same specification, and attain the solid image display device of low cost. It aims at offer of the solid image display device using the solid image display approach and it which have at least one effectiveness of **.
[0016]
[Means for Solving the Problem] The solid image display approach of this invention (2-1) Each of two or more parallax images from the parallax image source which has parallax image information is divided into a stripe pixel. Arrange these a part of two or more stripe pixels in predetermined sequence, compound one stripe image, and it displays on a display. The opening pattern which consists of the predetermined light transmission section and the optical predetermined protection-from-light section of a pitch on the space light modulation element prepared in the position of the front of this display or back is displayed. When acquiring stereoscopic vision by carrying out incidence of the stripe pixel corresponding to the eye of each right and left of this stripe image to the eye of right and left of an observer by this space light modulation element, respectively, It is characterized by synchronizing for every pixel and every scanning line on the scanning line which corresponds and scans this display and this space light modulation element, and displaying this stripe image and this opening pattern etc.
[0017] Especially (2-1-1) The scanning line which corresponds and scans said display and said space light modulation element performs interlace scanning.
(2-1-2) Scan the scanning line which corresponds and scans said display and said space light modulation element in the direction of a vertical.
(2-1-3) Said two or more parallax images are parallax images on either side. The 1st stripe image which said stripe image arranged by turns the odd-numbered stripe pixel of the stripe pixels into which the parallax image of this right was divided, and the even-numbered stripe pixel of the stripe pixels into which the parallax image of this left was divided, and was compounded, Or it is the 2nd stripe image which arranged by turns the even-numbered stripe pixel of these stripe pixels into which the parallax image of this right was divided, and the odd-numbered stripe pixel of these stripe pixels into which the parallax image of this left was divided, and compounded them. this -- after displaying one of the two stripe images on this display, the stripe image of another side is displayed continuously and the opening pattern which switched the light transmission section and the optical protection-from-light section on said space light modulation element is displayed in that case.
(2-1-4) Said stripe image is displayed on a part of screen of said display, displays a non-stripe image on the part of the remainder of this screen, displays an opening pattern on the part corresponding to this stripe image displayed on this display among the screen of said space light modulation element, and changes the part of the remainder in the screen of this space light modulation element into a light transmission condition.
(2-1-5) Display said stripe image on a part of screen of said display, it displays a non-stripe image on the part of the remainder of this screen, and displays an opening pattern on the screen of said space light modulation

element on the whole surface.
(2-1-6) The display width of face of the light transmission section of said opening pattern displayed on the display width of face and/or said space light modulation element of each stripe pixel which constitutes said stripe image displayed on said display, and the optical protection-from-light section is two or more width of face of the pixel which constitutes each screen.
(2-1-7) The display width of face of each stripe pixel which constitutes said stripe image displayed on said display is 1 pixel in width of face of the pixel which constitutes the screen of this display, and the display width of face of the light transmission section and the optical protection-from-light section of said opening pattern displayed on said space light modulation element is two or more width of face of the pixel which constitutes the screen of this space light modulation element.
(2-1-8) The display width of face of each stripe pixel which constitutes said stripe image displayed on said display is two or more width of face of the pixel which constitutes the screen of this display, and the display width of face of the light transmission section of said opening pattern displayed on said space light modulation element and the optical protection-from-light section is 1 pixel in width of face of the pixel which constitutes the screen of this space light modulation element.
(2-1-9) Each screen of said display and said space light modulation element has the pixel of matrix structure.
(2-1-10) From the stripe image displayed on said display, the light which consists of a predetermined polarization light is injected.
(2-1-11) Said space light modulation element consists of liquid crystal devices.
(2-1-12) Control at least one of the component of said stripe image, and the components of said opening pattern by the signal from the observation condition input means which the observation condition detection means or observer who detects an observer's view location automatically inputs.
(2-1-13) Control spacing of said display and said space light modulation element by the spacing control means based on the signal from the observation condition input means which the observation condition detection means or observer who detects an observer's view location automatically inputs.
(2-1-14) Use it from three or more original parallax images which constitute said parallax image information with the signal from the observation condition input means which the observation condition detection means or observer who detects an observer's view location automatically inputs, choosing said parallax image.
(2-1-15) The signal from the observation condition input means which the observation condition detection means or the observer who detects an observer's view location automatically inputs generates said parallax image according to an observer's view location from the data which constitute said parallax image information, or respond to an observer's view location, interpolate or reconfigurate this parallax image and create it from at least two original parallax images which constitute this parallax image information.
(2-1-16) Precede two or more scanning lines preceded with two or more pixels preceded with the pixel displayed on this space light modulation element synchronizing with the time of synchronizing said display and said space light modulation element for every pixel and every scanning line, and displaying said stripe image and said opening pattern, or the scanning line synchronized and displayed as the protection-from-light section, and display them.
(2-1-17) The screen of said display and said space light modulation element is divided into two or more fields of the respectively same magnitude along with the scanning line, and from these two or more fields, the scanning line of the same location is chosen as coincidence, scan it relatively, synchronize for every scanning line with which every pixel and these two or more scanning lines correspond on these two or more scanning lines on this display and this space light modulation element, and display said stripe image and said opening pattern.
[0018] Moreover, solid image display device of this invention (2-2) Each of two or more parallax images from the parallax image source which has parallax image information is divided into a stripe pixel. One stripe image which arranged these a part of two or more stripe pixels in predetermined sequence, and compounded it is displayed on a display. The opening pattern which consists of the predetermined light transmission section and the optical predetermined protection-from-light section of a pitch on the space light modulation element prepared in the position of the front of this display or back is displayed. When acquiring stereoscopic vision by carrying out incidence of the stripe pixel corresponding to the eye of each right and left of this stripe image to the eye of right and left of an observer by this space light modulation element, respectively, It is characterized by synchronizing for every pixel and every scanning line on the scanning line which corresponds and scans this

display and this space light modulation element, and displaying this stripe image and this opening pattern etc.
[0019] Especially (2-2-1) The scanning line which corresponds and scans said display and said space light modulation element is performing interlace scanning.
(2-2-2) The scanning line which corresponds and scans said display and said space light modulation element is scanned in the direction of a vertical.
(2-2-3) Said two or more parallax images are parallax images on either side. The 1st stripe image which said stripe image arranged by turns the odd-numbered stripe pixel of the stripe pixels into which the parallax image of this right was divided, and the even-numbered stripe pixel of the stripe pixels into which the parallax image of this left was divided, and was compounded, Or the even-numbered stripe pixel of these stripe pixels into which the parallax image of this right was divided, It is the 2nd stripe image which arranged by turns the odd-numbered stripe pixel of these stripe pixels into which the parallax image of this left was divided, and compounded it. this -- the opening pattern displayed on the occasion of the display of the 1st stripe image -- this -- the opening pattern displayed on the occasion of the display of the 2nd stripe image -- mutual -- relation with reverse light transmission section and optical protection-from-light section -- it is -- this -- two stripe images are displayed continuously.
(2-2-4) Said stripe image is displayed on a part of screen of said display, displays a non-stripe image on the part of the remainder of this screen, displays an opening pattern on the part corresponding to this stripe image displayed on this display among the screen of said space light modulation element, and changes the part of the remainder in the screen of this space light modulation element into a light transmission condition.
(2-2-5) Display said stripe image on a part of screen of said display, it displays a non-stripe image on the part of the remainder of this screen, and displays an opening pattern on the screen of said space light modulation element on the whole surface.
(2-2-6) The display width of face of the light transmission section of said opening pattern displayed on the display width of face and/or said space light modulation element of each stripe pixel which constitutes said stripe image displayed on said display, and the optical protection-from-light section is two or more width of face of the pixel which constitutes each screen.
(2-2-7) The display width of face of each stripe pixel which constitutes said stripe image displayed on said display is 1 pixel in width of face of the pixel which constitutes the screen of this display, and the display width of face of the light transmission section of said opening pattern displayed on said space light modulation element and the optical protection-from-light section is two or more width of face of the pixel which constitutes the screen of this space light modulation element.
(2-2-8) The display width of face of each stripe pixel which constitutes said stripe image displayed on said display is two or more width of face of the pixel which constitutes the screen of this display, and the display width of face of the light transmission section and the optical protection-from-light section of said opening pattern displayed on said space light modulation element is 1 pixel in width of face of the pixel which constitutes the screen of this space light modulation element.
(2-2-9) Each screen of said display and said space light modulation element has the pixel of matrix structure.
(2-2-10) Said space light modulation element is a liquid crystal device.
(2-2-11) Said space light modulation element is a ferroelectric liquid crystal component.
(2-2-12) Said display is a liquid crystal device.
(2-2-13) Said display is a ferroelectric liquid crystal component.
(2-2-14) Said display consists of spontaneous light type television and one polarizing plate.
(2-2-15) Inject the light which consists of a predetermined polarization light, and a liquid crystal device and one polarizing plate constitute said space light modulation element from the stripe image displayed on said display.
(2-2-16) Control at least one of the component of said stripe image, and the components of said opening pattern by the signal from the observation condition input means which the observation condition detection means or observer who detects an observer's view location automatically inputs.
(2-2-17) Control spacing of said display and said space light modulation element by the spacing control means based on the signal from the observation condition input means which the observation condition detection means or observer who detects an observer's view location automatically inputs.
(2-2-18) Use it from three or more original parallax images which constitute said parallax image information with the signal from the observation condition input means which the observation condition detection means or observer who detects an observer's view location automatically inputs, choosing said parallax image.

(2-2-19) The signal from the observation condition input means which the observation condition detection means or the observer who detects an observer's view location automatically inputs generates said parallax image according to an observer's view location from the data which constitute said parallax image information, or respond to an observer's view location, interpolate or reconfigurate this parallax image and create it from at least two original parallax images which constitute this parallax image information.
(2-2-20) Precede two or more scanning lines preceded with two or more pixels preceded with the pixel displayed on this space light modulation element synchronizing with the time of synchronizing said display and said space light modulation element for every pixel and every scanning line, and displaying said stripe image and said opening pattern, or the scanning line synchronized and displayed as the protection-from-light section, and display them.
(2-2-21) The screen of said display and said space light modulation element is divided into two or more fields of the respectively same magnitude along with the scanning line, and from these two or more fields, the scanning line of the same location is chosen as coincidence, scan it relatively, synchronize for every scanning line with which every pixel and these two or more scanning lines correspond on these two or more scanning lines on this display and this space light modulation element, and display said stripe image and said opening pattern. It is characterized by things etc.
[0020] Furthermore, solid image display device of this invention (2-3) The parallax image for the right-and-left eyes from the parallax image source is respectively divided into a stripe pixel. The display which carries out sequential formation while scanning one stripe image which arranged this stripe pixel in predetermined sequence, and compounded it, The space light modulation element which the opening pattern which consists the front or behind this display of the predetermined light transmission section and the optical predetermined protection-from-light section of a pitch is synchronized with this scan, and carries out sequential formation is arranged. It is characterized by carrying out stereoscopic vision etc. by carrying out incidence of the stripe pixel corresponding to the eye of each right and left of this stripe image for the light from this stripe image displayed on this display to the eye of right and left of an observer with this opening pattern, respectively.
[0021] Especially (2-3-1) Said space light modulation element is prepared ahead of said display, and it has the linear Fresnel lens which has chisel power horizontally between the front of this space light modulation element, or this display and this space light modulation element.
(2-3-2) The space light modulation element illuminated with the light source means is prepared behind said display, and it has the linear Fresnel lens which has chisel power horizontally between the front of this display, or this display and this space light modulation element. It is characterized by things etc.
[0022] Moreover, the solid image display approach of this invention (2-4) The parallax image for the right-and-left eyes from the parallax image source is respectively divided into a stripe pixel. Sequential formation is carried out scanning on a display one stripe image which arranged this stripe pixel in predetermined sequence, and compounded it. The light from this stripe image displayed on this display with the opening pattern which the predetermined light transmission section and the optical predetermined protection-from-light section of a pitch were synchronized with this scan, and carried out sequential formation on the space light modulation element It is characterized by carrying out stereoscopic vision etc. by carrying out incidence of the stripe pixel corresponding to the eye of each right and left of this stripe image to the eye of right and left of an observer, respectively.
[0023]
[Embodiment of the Invention] Drawing 1 Operation gestalt 1 of the solid image display device of ******** It is an important section schematic diagram. Moreover, drawing 2 is the operation gestalt 1. The explanatory view of the solid image display approach, drawing 3 Operation gestalt 1 The explanatory view of the drive approach, drawing 4 Operation gestalt 1 It is the explanatory view of a display condition. In addition, an image display part is a level sectional view among drawing. the inside of drawing, and 1 Liquid crystal device (LCD) which is a display, for example, has the back light light source etc. -- it is -- the screen consists of many pixels of matrix structure, and displays an image by the scanning-line scan of a no interlace. 11 (11A) Display 1 It is the ** type Fig. which expressed typically the condition of the below-mentioned stripe image displayed on an image display side.
[0024] 2 It is a ****** light modulation element, constitute from a transparency mold liquid crystal device etc., the screen consists of many pixels of matrix structure, and it is a display 1. In case a solid image is displayed, the predetermined light transmission section (opening) and the optical predetermined protection-from-light

section of a pitch are arranged horizontally, and parallax barrier pattern (opening pattern) 2A or 2B is formed (it displays). AR and AL They are an observer's right eye and a left eye, respectively.
[0025] In addition, it sets on these specifications and is a display 1. Or space light modulation element 2 The "front", and a call and its opposite side are called "back" for an observer side. Therefore, at this operation gestalt, it is a display 1. It is the space light modulation element 2 to the front. It arranges.
[0026] 15 is 3 of the multi-channel image pick-up equipment which is the parallax image source, for example, has VTR or the multi-channel camera of many channels, or a photographic subject. It consists of dimension data etc. It is two or more images from these, and 3 below. Suppose that dimension data are called parallax image information. In addition, although it has two or more images with VTR of many channels, and multi-channel image pick-up equipment, since a parallax image (image with parallax) is chosen from these images, suppose that two or more of these images are called a original parallax image.
[0027] 9 It is a ****** condition input means and is observation positional information and display 1 of an observer. Information, such as a viewing area of the solid image to display, is inputted. 3 The parallax image RS for right eyes and the parallax image LS for left eyes are taken out from the parallax image information which is a ********** means and the parallax image source 15 has, and these parallax images RS and LS are divided horizontally, generate the stripe pixel of the shape of a longwise stripe, arrange them in by turns, and it is 1. It compounds in the stripe image of **. Hereafter, the stripe pixel based on the parallax image RS is displayed as Ri (i= 1, 2, 3, 4 ...), and the stripe pixel based on the parallax image LS is expressed as Li (i= 1, 2, 3, 4 ...).
[0028] 4 It is a ** display drive circuit and is the image-processing means 3. It is a display 1 about the stripe image compounded and outputted. It displays on the screen. 5 a ** barrier drive circuit -- it is -- image-processing means 3 from -- a signal -- space light modulation element 2 It drives and a parallax barrier pattern is formed on it.
[0029] The relation between the stripe image 11 of this operation gestalt and a parallax barrier pattern is explained. drawing 1 it is alike and is shown -- as -- an observer's both-eyes spacing (base length) -- display image 11 (11A) on O and an image display side (stripe image) from -- the observation distance to an observer's eye -- C -- Display 1 Space light modulation element 2 (parallax barrier) Spacing D, space light modulation element 2 the width of face of opening of the formed parallax barrier pattern -- B' and display 1 pixel spacing (width of face) of the stripe pixel which constitutes the stripe image to display -- P ** -- if it carries out, in order to acquire stereoscopic vision, it is necessary to satisfy the following relation among these
[0030]
D =P-C /(O+P) ---------- (1) B'=P- (C-D) / C ---------- (2) -- since observation width of face has the breadth of finite in an observation location still in fact, these amounts of many are changed a little, and are set up. S.H.Kaplan has stated these relation to the detail in said reference.
[0031] It sets in this operation gestalt and is a display 1. It carries out and is pixel size. The liquid crystal display of 0.110mm(horizontal) x 0.330mm (length) is used, and it is the 1. Since the pixel was made into the width of face of the stripe pixel of each parallax image Pixel spacing serves as P = 0.110 mm. On the other hand, since the base length is set up with O= 65mm and observation distance is set up with C= 1000 mm as observation conditions, it is the space light modulation element 2. Configuration item D= 1.69mm and B'=0.1098mm It becomes. In addition, in consideration of observation broadening, some are tuned finely.
[0032] Drawing 1, and 2, 3 and 4 The solid image display approach of this invention is explained.
[0033] That is, it sets at a certain time of day (at the time of the display condition of drawing 2 (A)), and is the image-processing means 3. It is 2 from the parallax image source 15. The parallax images RS and LS of ** are taken out. them -- longwise stripe pixels Ri and Li dividing -- these stripe pixels -- for example, R1L2R3L4R5 L6 from the left end of a plot side .... and alternation -- arranging -- the 1st Stripe image 11A ****** -- it compounds. This 1st [the] Stripe image 11A Data are the display drive circuit 4. It is inputted and is the display drive circuit 4. Display 1 It is the 1st to an image display side. Stripe image 11A It displays.
[0034] coincidence -- image processing means 3 the output of the data of the above-mentioned stripe image -- synchronize -- barrier drive circuit 5 the image data of a parallax barrier pattern -- input -- barrier drive circuit 5 space light modulation element 2 upper point G opening and closing opening and closing opening and closing -- the 1st which formed the light transmission section and the optical protection from light section of width of face B' by turns in the sequence ... parallax barrier pattern 2A display.
[0035] The formation field of this parallax barrier pattern is said display 1. The image field (the case of the whole surface is shown in drawing 1) to which the stripe image 11 is displayed is supported.

[0036] this time -- a right eye AR -- the 1st Only the parallax image for right eyes which consisted of .... carries out incidence. parallax barrier pattern 2A -- minding -- stripe pixel R1R3R5 -- a left eye AL -- the 1st parallax barrier pattern 2A -- minding -- the stripe pixel L -- the parallax image for left eyes which consisted of .... 2L4 L6 -- incidence -- carrying out -- the principle as the conventional parallax barrier method with the same observer -- the 1st Stripe image 11A Stereoscopic vision can be carried out.
[0037] 1 In Time of Day Which Finishes Carrying Out Frame Scanning and is Scanning the Again Same Scanning Line as above (at the Time of Display Condition of Drawing 2 (B)) Display 1 With the above-mentioned sequence, as a stripe image 11 to display, reverse, That is, it is a stripe pixel L1R2L3R4L5R6 ... The 2nd put in order Stripe image 11B It displays. space light modulation element 2 **** -- point G the open-close-open opening-and-closing close contrary to the above-mentioned sequence -- the 2nd which formed the light transmission section and the optical protection-from-light section by turns in the sequence ... Parallax barrier pattern 2B is displayed.
[0038] this time -- a right eye AR -- the 2nd Only the parallax image for right eyes which consisted of .... carries out incidence. parallax barrier pattern 2B -- minding -- stripe pixel R2R4R6 -- a left eye AL -- parallax barrier pattern 2B -- minding -- stripe pixel L1L3L5 -- the parallax image for left eyes which consisted of .... incidence -- carrying out -- the principle as the conventional parallax barrier method with the same observer -- the 2nd Stripe image 11B Stereoscopic vision can be carried out.
[0039] And it is this 2 by turns. It is a display 1 so that it may be in the display condition of **. Space light modulation element 2 Synchronize for every pixel and by scanning and displaying a stripe image and a parallax barrier pattern a right eye -- stripe pixel R1R2R3R4 -- all the parallax images RS that consisted of .... a left eye -- stripe pixel L1L2L3L4 -- all the parallax images LS that consisted of .... are observed without a flicker, respectively.
[0040] Drawing 3 and 4 It is the operation gestalt 1 to a detail further. An operation is explained.
[0041] As mentioned above, the 1st scanning line Stripe image 11A The 1st () It is drawing 3 in case parallax barrier pattern 2A is displayed. It is a display 1 so that it may be shown. Space light modulation element 2 [Y1 Y2, Y3,] [Y4] ..... image-processing means 3 from -- a synchronizing signal -- minding -- respectively -- Y a driver 6 and 6' -- driving -- coincidence -- X A driver 7 and 8 from -- a display driving signal and a barrier driving signal are inputted synchronously, respectively. That is, display 1 The 1st scanning line Y1 and space light modulation element 2 The scanning line Y1 is driven to coincidence, and it is a display 1. The 1st Pixel Xi and the space light modulation element 2 on the scanning line Y1 The 1st The pixel Xi on the scanning line Y1 (scanning line corresponded and scanned) is driven synchronously, and an image is displayed on the pixel.
[0042] first, display 1 the whole screen surface -- the 2nd Stripe image 11B it displays -- having -- space light modulation element 2 **** -- the 2nd Suppose that parallax barrier pattern 2B was displayed. Drawing 4 (A) It is the above condition to the display 1 so that it may be shown. The 1st To the pixel on the scanning line Y1 RLRLRL compounded from the stripe pixel of a parallax image on either side -- the 1st located in a line with .... (right -- R -- it outlines like the left although it is ... 1L2R3L4R5 L6) Stripe image 11A While indicating the applicable part by sequential space light modulation element 2 The 1st the pixel on the scanning line Y1 -- drawing 4 (B) it is shown -- as -- opening-and-closing opening-and-closing opening and closing -- the 1st with which the ... and light protection-from-light section and the light transmission section were located in a line by turns parallax barrier pattern 2A -- sequential display 1 It displays synchronously for every pixel.
[0043] And it is the 2nd next. The scanning line Y2 is chosen and it is a display 1. Space light modulation element 2 The 2nd It is the 1st like [the pixel on the scanning line Y2] a front. Stripe image 11A An applicable part and the applicable part of 1st parallax barrier pattern 2A are synchronously displayed for every pixel.
[0044] Drawing 4 It is the 5th as the scans of all finish then. The scanning line Y5 is chosen and it is a display 1. The 7th The pixel data of the stripe pixel R7 are displayed on a pixel X7 (drawing 4 (A)), and it synchronizes with this, and is the space light modulation element 2. The 7th The situation of the moment (drawing 4 (B)) of forming the optical protection-from-light section in a pixel X7 is shown typically. Therefore, display 1 In the upper part, it is the 1st. Stripe image 11A It is displayed and is the 2nd in the lower part. Stripe image 11B It is displayed. Moreover, space light modulation element 2 In the upper part, it is the 1st. Parallax barrier pattern 2A is displayed and it is the 2nd in the lower part. Parallax barrier pattern 2B is displayed.
[0045] If this is repeated successively and the scan of the last scanning line finishes, it will be the 1st to the whole display screen. Stripe image 11A It is displayed and is this The 1st Space light modulation element 2 which forms parallax barrier pattern 2A It is the 1st by minding and observing. Stripe image 11A It is

observable as a solid image.
[0046] Subsequently, the 1st It scans sequentially from the scanning line and is a display 1 in that case. With the above-mentioned sequence, as a stripe image 11 to display, reverse, that is, a stripe pixel -- LRLRLR -- the 2nd located in a line with .... (right -- L -- one R2L3R4L5R6 -- it outlines like the left although it is ...) Stripe image 11B An applicable part is displayed. space light modulation element 2 The 2nd In the sequence ..., form the light transmission section and the optical protection-from-light section by turns, and they are displayed. the open-close-open opening-and-closing close contrary to the above-mentioned sequence as a parallax barrier pattern 2B -- This space light modulation element 2 It minds and is a display 1. It is the 2nd by observing. Stripe image 11B It is observable as a solid image.
[0047] Therefore, at this operation gestalt, it is stripe image 11A. 11B Since stereoscopic vision is carried out by turns, they are each eyes AR and AL of an observer. A high-definition solid image can be observed without displaying each parallax image RS and LS without lack, and spoiling the resolution of a parallax image. For this, the display resolution which resolution uses in the solid image display device which used the conventional parallax barrier method is one half at least. Considering falling, it is 2. It is a twice as many highly minute image as this.
[0048] and at this operation gestalt , it be a display 1 . space light modulation element 2 one on the scanning line by take and drive a synchronization for every pixel , a stripe pixel and opening of the parallax barrier pattern corresponding to it be maintain the relation which always synchronize , change and can observe a solid image correctly in any time amount during the display of a stripe image . Therefore, with this operation gestalt, the cross talk of a parallax image on either side is reduced remarkably.
[0049] Furthermore, at this operation gestalt, it is the space light modulation element 2. Since the light transmission section and the optical protection-from-light section of a parallax barrier pattern which are formed upwards interchange by turns, it has the effectiveness that the contrast of a moire pattern falls and that the repeat structure of the light transmission section and the optical protection-from-light section of a parallax barrier pattern is not conspicuous.
[0050] Furthermore, display 1 used for this operation gestalt And space light modulation element 2 Although it is ideal to use what has a high-speed frame rate Since a stripe image and a parallax barrier pattern are synchronized with this operation gestalt and it is displaying Since each parallax image is always carrying out incidence and an observer does not sense a flicker, without producing a cross talk in the eye of each right and left, it is 60Hz - 120Hz. The thing of a frame rate can also be used.
[0051] in addition, space light modulation element 2 the thing in which high contrast and a high-speed drive are possible in order for the parallax barrier pattern formed on it to perform separation with the parallax image of a right eye, and the parallax image of a left eye -- required -- these points to ferroelectric liquid crystal component (FLC) display 1 of this operation gestalt space light modulation element 2 ****** -- it is suitable to use.
[0052] moreover, display 1 Space light modulation element 2 ****** -- since it is easy to secure a synchronization since the display speed (speed of response) is the same if it uses the liquid crystal device of the same class in using a liquid crystal device, and the same drive circuit can be used, it is convenient.
[0053] in addition -- this operation gestalt -- image-processing means 3 from -- although driven with the synchronizing signal -- as the drive approach -- display drive circuit 4 a synchronizing signal is generated -- making -- taking the drive timing of the barrier drive circuit 5 **** -- Y The various drive approaches, such as taking a synchronization with a driver, can be used.
[0054] Moreover, it is good even if it considers as a display 1 with this operation gestalt. 1 It is the spacing P of a stripe image about a pixel. Case [it is equal] R1 and L2 (i.e., stripe pixels) .... It is a display 1, respectively. 1 Although the case of being equivalent to a pixel was shown, they are the stripe pixels Ri and Li. Pixel width of face is RGB at the time of it being good also as two or more pixel width of face of a display 1, for example, performing color display. It is spacing P about pixel width of face.
[0055] Moreover, it is 2 here. Although the case where the parallax image of ** was displayed was explained, two or more parallax images are compounded, a stripe image is created, and this is observed through a suitable parallax barrier. The same approach can be used also in a "parallax panorama gram."
[0056] Moreover, space light modulation element 2 of this invention Since opening of a long rectangle is formed in the direction of a vertical, with matrix-like pixel structure, you may not be and vertical Rhine-like pixel structure is sufficient.
[0057] In addition, the width of face P of a stripe pixel, a number, etc. are the components of a stripe image, and

width-of-face B' of the opening and the protection-from-light section of a parallax barrier pattern etc. is the component of an opening pattern (parallax barrier pattern).
[0058] this operation gestalt -- observation condition input means 9 from -- a signal -- above -- at least 1 of the component of a stripe image, and the component of an opening pattern ** is controlled.
[0059] Drawing 5 Operation gestalt 2 of the solid image display device of ******** It is an important section schematic diagram. This operation gestalt is the operation gestalt 1. It sets in a configuration and is a display 1. And space light modulation element 2 It especially carries out and is an operation gestalt using TN liquid crystal device (TN liquid crystal cell). Other parts are the same as the operation gestalt 1.
[0060] 1 It is the display which displays the ** stripe image 11, and is 2. It constitutes so that the TN liquid crystal cell 23 (a glass substrate, an electrode, etc. are un-illustrating) pinched with the polarizing plates 22 and 24 of ** may be illuminated with the back light 21 which has a reflecting plate and a light guide plate. Therefore, display 1 The light of the linearly polarized light injects from the image to display. 2 It is a ****** light modulation element and is a display 1. It is the TN liquid crystal cell 25 to an observer side in a side 1 The polarizing plate 26 of ** is prepared and constituted and a stripe-like parallax barrier pattern is displayed.
[0061] It is the operation gestalt 1 also at this operation gestalt. It is a display 1 similarly. Upper stripe images 11A and 11B Space light modulation element 2 Upper parallax barrier pattern 2A and 2B Since it changes and displays synchronously, the resolution of a parallax image does not fall, either, but the solid image of good image quality can be observed.
[0062] Drawing 6 It is an explanatory view about the relation of the polarization shaft orientation of a polarizing plate and the observation image in a **** operation gestalt. For example, display 1 of this operation gestalt It carries out and the case where the polarization shaft of a polarizing plate 22 is suitable in the direction perpendicular to space so that the liquid crystal display in the Nor Marie White mode may be used and illustrated is considered. At this time, it is changing into the condition of a cross Nicol's prism, and 90 degrees of polarization shafts rotate and, as for polarizing plates 22 and 24, only the light which carried out incidence to the part (OFF part) in which the electrical potential difference is not impressed to the TN liquid crystal cell 23 among the light from a back light 21 penetrates a polarizing plate 24.
[0063] On the other hand, it is the space light modulation element 2. They are the TN liquid crystal cells 25 and 1 too. It consists of polarizing plates 26 of **, and an electrical potential difference is impressed only for opening (ON part) of a parallax barrier pattern. therefore, display 1 from -- the penetrated display-image light (the polarization shaft is parallel to space) does not receive a modulation in plane of polarization in opening (ON part) of this parallax barrier pattern, but penetrates a polarizing plate 26 (the polarization shaft is parallel to space) as it is. A left eye image (L image) is penetrated in the direction of a left eye AL. And a right eye image (R image) is penetrated in the direction of a right eye AR, and a solid image is observed. The above is explanation of the relation between the polarization shaft orientation of a polarizing plate, and an observation image.
[0064] With the conventional equipment currently indicated by JP,3-119889,A, it is 4. Since the polarizing plate of ** was used, there was a problem that the brightness of a display image fell by absorption of this polarizing plate. On the other hand, at this operation gestalt, it is a polarizing plate 1 Since it is ******(ing), the brightness of a display image is raised.
[0065] Space light modulation element 2 The polarization shaft orientation of the polarizing plate to constitute can be set up besides the above. For example, drawing 7 The polarization shaft of polarizing plate 26' may be perpendicular to space so that it may be shown, and it is the space light modulation element 2 then. An electrical potential difference is not impressed to opening of the parallax barrier pattern to display. in this case, display 1 from -- the penetrated image display light (the polarization shaft is parallel to space) rotates 90 degrees of plane of polarization by this opening (OFF part), and it penetrates polarizing plate 26' to which the polarization shaft was set at right angles to space, and it carries out incidence to each eye. That is, the polarization direction of the image light which carries out incidence to each eye in this case is drawing 6. It lies at right angles to a case.
[0066] The same thing is a display 1. 3 used for the solid image display device of this invention according to each condition although generated also with the display mode of the liquid crystal panel to be used What is necessary is just to set up the polarization shaft of the polarizing plate of **.
[0067] In addition, drawing 8 It is a display 1 so that it may be shown. CRT A spontaneous light type display and 1 It can also constitute from a polarizing plate of **. [like]
[0068] Drawing 9 Operation gestalt 3 of the solid image display device of ******** It is an important section

schematic diagram. This operation gestalt is equipment which makes good stereoscopic vision possible over the large range by detecting an observer's view location automatically and controlling actuation of a solid image display device according to it.

[0069] Among drawing, 36 are an observer image input means and input the image of the observer who observes this equipment. The observer image input means 36 of this operation gestalt is 1. It constitutes from a camera of a base. 37 is a camera controller and controls the observer image input means 36. 38 is a view location / direction detector of a look, and detects the view location and the direction of a look of an observer by the image processing from the signal from the observer image input means 36. The observer image input means 36, the camera controller 37, and the view location / direction detector of look 38 grade constitute an element of the observation condition detection means 30.

[0070] An operation of this operation gestalt is explained. An observer's image photoed with the observer image input means 36 is inputted into a view location / direction detector 38 of a look through the camera controller 37. In a view location / direction detector 38 of a look, an image processing extracts the image of an observer's eye from the inputted image, and the view location and the direction of a look of an observer are detected.

[0071] Operation gestalt 1 To the described appearance, the display action of the solid image display device of this invention is the conditional expression (1) of a parallax barrier, and (2). Since it carries out by being based If an observer moves forward and backward, it will respond to an observer's location (observation distance), and it is a display 1. Pixel spacing P of the stripe pixel to display (width of face) While changing, it is the space light modulation element 2. It is desirable to change width-of-face B' of opening of the parallax barrier pattern to form.

[0072] Here, it is a display 1. Pixel size 0.110mm (width) A x0.330mm (length) liquid crystal display is used, and it is the 3. Since the pixel was made into the stripe width of face (width of face of a stripe pixel) of each parallax image, pixel spacing is P=0.110 x3= 0.330 mm. It becomes.

[0073] And it is the 1st first. As observation conditions, the base length is set up with O= 65mm, and observation distance is set up with C= 1000mm. It is the space light modulation element 2 by this. Conditions D= 5.05mm and B'=0.3283mm It is set up. In addition, it is desirable to tune some finely in consideration of observation broadening. Supposing an observer moves to a location with an observation distance of about 1500mm from this location The observation distance in an observation condition changes with C= 1500mm, and it is spacing D in this case. It is a display 1 supposing it does not change. Width of face P of the upper stripe pixel P= 0.220mm, Space light modulation element 2 It is B'=0.2192mm about width-of-face B' of opening of the upper parallax barrier pattern. If it carries out, it will be conditional expression (1) and (2). It is satisfied. Then, it is the width of face P of the stripe pixel of a stripe image in this case. Display 1 2 It displays by the pixel and is the space light modulation element 2 about width-of-face B' of opening of a parallax barrier pattern. 2 What is necessary is just to form by the pixel.

[0074] thus , with this operation gestalt , an observation condition detection means 30 detect an observer view location , and it be the occasional observation distance C after this . the width of face P of the stripe pixel which compute and constitute a stripe image according to this and a space light modulation element 2 carry out stereoscopic vision good over the observation location of a large range by control suitably width of face B ' (and the width of face of the protection from light section) of opening of the parallax barrier pattern display .
 [0075] In addition, as an observation condition detection means 30 of this operation gestalt, it is 2. Use the camera of a base, or form the magnetic field in an observer's perimeter, and an observer's head is made to equip with a magnetic sensor, the output from this sensor can be used or look detection means, such as a well-known eye mark camera, can also be used.

[0076] moreover , even if it set in this operation gestalt , it be the observation condition input means 9 . while an observer input a view location himself or observe a display image , an observer control an adjustment switch etc. , and it be a display 1 . at least 1 of the component of the stripe image which show the solid image in the top , and the component of an opening pattern ** be also controllable .

[0077] Drawing 10 is the operation gestalt 4 of the solid image display device of this invention. It is an important section schematic diagram. this operation gestalt -- operation gestalt 3 a different point -- observation distance C the case where it changes -- operation gestalt 3 **** -- width of face P of a stripe pixel having changed width-of-face B' of opening of a parallax barrier pattern, and having made the solid image observe -- receiving -- this operation gestalt -- display 1 Space light modulation element 2 Spacing D It is the point of changing and making a solid image observing. About others, it is the same.

[0078] the inside of drawing, and 33 -- display 1 Space light modulation element 2 Spacing D It is the adjustable SU **-sir to control and the die length changes with signals. 34 -- a spacer driving means -- it is -- image-processing means 3 from -- the adjustable spacer 33 is controlled by the signal. The adjustable spacer 33 and the spacer driving means 34 grade constitute an element of a spacing control means.
[0079] An operation of this operation gestalt is explained. With this operation gestalt, the observation condition detection means 30 detects an observer's view location, and it is the occasional observation distance C after this. It computes, the adjustable spacer 33 is controlled through the spacer driving means 34 according to this, and it is a display 1. Space light modulation element 2 Spacing D It changes and a solid image is made to observe.
[0080] The principle is explained below. now, a formula (1), and (2) :C =D-(O+P)/P**k-D rewritten as follows ---------- (3) -- B'=P-(k-1)/k ---------- (4) -- here, it is k **(O+P)/P.
[0081] By these formulas, it is a display 1. Width of face P of the stripe pixel of the stripe image 11 to display Base length It is k if O is determined. It is determined and width-of-face B' of opening of a parallax barrier pattern is determined uniquely. Moreover, spacing D Observation distance C It is proportional.
[0082] Therefore, observation distance C It follows and is a display 1. Space light modulation element 2 which forms the parallax barrier pattern Spacing D The upper conditional expression can be satisfied by controlling.
[0083] For example, it is set to width of face of P= 0.330mm of a stripe pixel, O= 65mm of base lengths then, and k= 197.97, and is the 1st. In a location with an observation distance of C= 1000mm which is observation conditions, it is width-of-face B'=0.3283mm of D= 5.05 mm spacing and opening. Then, it is good. And an observer is the 2nd. It is spacing when it moves to a location with an observation distance of C= 1500mm which is observation conditions. D= 7.58mm and width-of-face B'=0.3283 of opening If it carries out, the upper conditional expression will be satisfied.
[0084] Moreover, in the equipment which follows a view location like this operation gestalt, and displays a solid image, if the location which forms opening of a parallax barrier pattern according to an observer's view location is appropriately shifted to a longitudinal direction to migration in an observer's longitudinal direction as shown in drawing 11, a solid image can be displayed good even in such a case.
[0085] Now and drawing 11 (A) As opening B' of a parallax barrier pattern shown in 51 in drawing so that it may be shown, it is the space light modulation element 2. 3 In forming by the pixel Drawing 11 (B) A view is A'R and A'L to width so that it may be shown. When it moves to a location, it is stripe image 11A about opening of a parallax barrier pattern. It receives and is 1 relatively. Only a pixel is shifted and it is 51'. If it forms so that it may be shown Even in such a case, stripe image 11A Stereoscopic vision can be carried out good. In addition, 52 and 52' It is as having mentioned above that it is a location used as opening of a time-sharing parallax barrier pattern.
[0086] Or it remains as it is and the location of opening of a parallax barrier pattern is a display 1. Even if it shifts the location of the stripe image 11 to display to a longitudinal direction, a solid image can be recognized good.
[0087] The operation gestalt 11 mentioned later is an operation gestalt which adopted the above approach.
[0088] Drawing 12 -14 are the operation gestalt 5 of the solid image display device of this invention. It is an explanatory view. At an old operation gestalt, it is a display 1. The parallax images R and LS for compounding the stripe image to display were always the same. That is, even if the observer changed the view location, they were the solid image display approach / equipment which does not produce change at all in the solid image currently observed and which can observe the always same solid image good.
[0089] On the other hand, the method of presentation which gives the surroundings lump display of the image according to view location change of an observer with this operation gestalt is used, and it responds to an observer's view location, and is a display 1. It differs in that the parallax images R and LS to display are changed.
[0090] drawing 12 -- operation gestalt 3 Or 4 Display 1 of the solid image display devices Space light modulation element 2 from -- only the becoming part is shown as an indicating equipment 20. an observer -- this display 20 to observation distance C only -- an image shall be observed from the distant location In addition, the image-processing means, the observation condition detection means, etc. are omitted.
[0091] On the other hand, drawing 13 is the important section schematic diagram of the parallax image source 15 of this operation gestalt. 12 are a photographic subject among drawing. KA, KB, KC, and KD -- respectively -- a camera -- it is -- a photographic subject 12 to distance C only -- the distant location -- respectively -- an observer's both-eyes spacing (base length) O At equal spacing, it arranged horizontally, arranges, and the

photographic subject is picturized, respectively. In addition, A-D It is the before [the optical system of each camera] side principal point. Moreover, drawing 14 is 4. It is the explanatory view of the image which the cameras KA, KB, KC, and KD of a base picturize. Therefore, in the case of this operation gestalt, the parallax image source 15 is always 4. It has the original parallax image of **.

[0092] An operation of this operation gestalt is explained. an observer needs to pass a location 18 (the location of the left eye [in / in right eye AR' / a location 17] AL and a left eye are AL') now from the location 17 (a right eye is AR and a left eye is AL) of drawing 12 -- the case where it moves to a location 19 (the location of left eye AL' [in / in right eye AR" / a location 18] and a left eye are AL") is considered.

[0093] as the image RS which an observer's right eye AR observes on a display 20 when an observer is in a location 17 -- Camera KA -- point A from -- the picturized original parallax image (drawing 14 (A)) is inputted into a display 20. The original parallax image (drawing 14 (B)) photoed from Point B with Camera KB as an image LS observed by an observer's left eye AL to coincidence is inputted into a display 20.

[0094] And an indicating equipment 20 is a display 1. Above-mentioned drawing 14 (A) as a parallax image for compounding the stripe image to display, and (B) 2 The original parallax image of ** is used and it is drawing 14 (A) as a right eye image. Considering an image as a left eye image, it is drawing 14 (B). A stripe image is compounded and displayed using an image. If it does in this way, an observer will observe the solid image when seeing a photographic subject from the location of Cameras KA and KB.

[0095] if an observer moves to a location 18 -- a display 20 top -- an observer's right eye AR' as the image RS to observe -- Camera KB -- point B from -- the picturized original parallax image (drawing 14 (B)) is inputted into a display 20. It is an observer's left eye AL' to coincidence. The original parallax image (drawing 14 (C)) photoed from Point C with Camera KC as an image LS to observe is inputted into a display 20.

[0096] And an indicating equipment 20 is a display 1. Above-mentioned drawing 14 (B) as a parallax image for compounding the stripe image to display, and (C) 2 The original parallax image of ** is used and it is drawing 14 (B) as a right eye image. Considering an image as a left eye image, it is drawing 14 (C). A stripe image is compounded and displayed using an image. If it does in this way, an observer will observe the solid image when seeing a photographic subject from the location of Cameras KB and KC.

[0097] if an observer moves to a location 19 -- a display 20 top -- an observer's right eye AR" as the image RS to observe -- Camera KC -- point C from -- the picturized original parallax image (drawing 14 (C)) is inputted into a display 20. It is an observer's left eye AL" to coincidence. The original parallax image (drawing 14 (D)) photoed from Point D with Camera KD as an image LS to observe is inputted into a display 20.

[0098] And an indicating equipment 20 is a display 1. Above-mentioned drawing 14 (C) as a parallax image for compounding the stripe image to display, and (D) 2 The original parallax image of ** is used and it is drawing 14 (C) as a right eye image. Considering an image as a left eye image, it is drawing 14 (D). A stripe image is compounded and displayed using an image. If it does in this way, an observer will observe the solid image when seeing a photographic subject from the location of Cameras KC and KD.

[0099] what consisted of parallax images which looked at the photographic subject from the direction where the solid images to observe differ when the observer moved and the view location was changed by the above actuation -- becoming -- a photographic subject 12 -- " -- turning -- being crowded -- " -- the solid image to see is observable.

[0100] At this operation gestalt, the parallax image source 15 is 4. It has the parallax image information which consists of the original parallax image of **. And it is 4 by the signal from the observation condition detection means 30. It is 2 from the original parallax image of **. It is used choosing the parallax image of ** and the solid image is displayed.

[0101] The before [each camera which constitutes the parallax image source 15 from this operation gestalt] side principal point location A, B, and C, and D Each eyes AR and AL (=AR') in each observation location, AL' (= AR"), and AL" Although it is made in agreement For example, an observer's right eye is between AR and AL(s) of a location 17, and a left eye is AR' and AL' of a location 18. When it is in between, as the right eye image RS -- drawing 14 (A) A original parallax image and drawing 14 (B) 2 of a original parallax image "interpolation" of a original parallax image to the image of ** -- carrying out -- 1 The right eye image (parallax image) RS of ** is compounded. It is drawing 14 (B) as a left eye image LS. A original parallax image and drawing 14 (C) 2 of a original parallax image A original parallax image to the image of ** is interpolated, and it is 1. The left eye image (parallax image) LS of ** is compounded. Thus, 2 which compounded newly and was created The parallax images R and LS of ** are used and it is a display 1. By compounding and displaying the

stripe image to display, the surroundings lump effectiveness of the smoother continuous image is realizable.
[0102] As the approach of this image interpolation, it is the approach using an EPI Poral plane image (EPI) better known than before, i.e., EPI. The approach (55 1 .Bolles et.al : for example, R.C Int.J.Computer Vision, Vol. No. 1, pp.7- 1987 publication) of searching a top for corresponding points and creating a interpolation image etc. can be used.
[0103] 4 shown in drawing 13 when the technique of this image interpolation is used It is not necessary to photo a photographic subject 12 by the camera system of a base for example, and is Point A. Point D 2 photoed with the camera of a location It can carry out by the ability repeating image interpolation using the original parallax image of **, a desired parallax image can be formed, and a stripe image can be compounded after this. (In addition, it carries out creating a parallax image with interpolation further to calling it "reconstruction of an image" by this invention using the parallax image created with interpolation.)
Moreover, also when an observer moves to a cross direction, it is also possible to perform same image interpolation, to form the parallax image according to each view location, and to compound a stripe image after this, and these people as the approach of these image processings It is more effective if the approach currently indicated by JP,7-129792,A is used.
[0104] moreover, operation gestalt 5 **** -- as the image to display -- 4 although the natural image photoed with the camera of a base is used -- CAD etc. -- 3, such as the so-called CG image created by computer, A dimension image can also be used. In this case, the "data" of a photographic subject is already 3. What is necessary is "to be able to generate" freely the parallax image seen from the location of arbitration, to generate two or more parallax images corresponding to each view location, and just to compound and display a stripe image from this, since it is dimension data.
[0105] If the parallax barrier method is used and a multi-image display (called a parallax panorama gram) is performed, in order to make a viewing area large conventionally or to give the "surroundings lump effectiveness", when the number of the parallax images then used will be set to n, it is 1/n about the resolution of a display. It was falling.
[0106] on the other hand -- this operation gestalt -- the fall of resolution -- at least 2 a part -- 1 it is . Furthermore, this operation gestalt is the operation gestalt 3. Or 4 Since the configuration is used, the fall of resolution has been prevented, and it is the operation gestalt 2 further. The brightness of an image will also be raised if a configuration is adopted.
[0107] Drawing 15 is the operation gestalt 6 of the solid image display device of this invention. It is the explanatory view of the solid image display approach. The configuration of this operation gestalt is the operation gestalt 1. Although it is the same, it is the operation gestalt 1. Display 1 Image display and space light modulation element 2 With this operation gestalt, the points synchronized and displayed for every scanning line differ to having displayed the display of a parallax barrier pattern synchronously for every pixel on the scanning line.
[0108] Drawing 15 (A) Operation gestalt 1 Drawing 2 It is in the same display condition as the shown display condition. this condition -- an observer -- space light modulation element 2 The 1st formed parallax barrier pattern 2A -- minding -- the 1st Stripe image 11A **** -- by things, the parallax image corresponding to an eye on either side can be observed by the eye on either side, and stereoscopic vision can be performed.
[0109] moreover, this operation gestalt -- drawing 15 (B) a condition -- the 2nd parallax barrier pattern 2B -- minding -- the 2nd Stripe image 11B **** -- things can perform stereoscopic vision of **. At this operation gestalt, it is a display 1. The stripe image 11 and the space light modulation element 2 to display It displays by synchronizing the light transmission section of the formed parallax barrier pattern for every scanning line, and is drawing 15 (A). The condition which shows, and drawing 15 (B) The condition which shows, and 2 The display condition of ** is repeated by turns and displayed.
[0110] that is, a certain time of day -- setting (at the time of the display condition of drawing 15 (A)) -- display 1 a certain scanning-line top -- stripe pixels Ri and Li of the parallax images RS and LS R1L2R3L4 -- the 1st compared with .... Stripe image The applicable part of 11A is displayed. It is the space light modulation element 2 to coincidence. On the correspondence scanning line, it is Point G. Close (optical protection-from-light section), open (light transmission section), close, and the open .... The light transmission section and the optical protection-from-light section are repeated and displayed in sequence, and it is the 1st. Parallax barrier pattern 2A is formed. this time -- a right eye AR -- stripe pixel R1R3R5 -- the right eye image which consisted of .... incidence -- carrying out -- a left eye AL -- the stripe pixel L -- only the left eye image which consisted of ....

2L4 L6 can carry out incidence, and can carry out stereoscopic vision. (However, a right eye image and a left eye image are one half of the resolution of the screen of a display 1, respectively.)
1 In Time of Day Which Finishes Carrying Out Frame Scanning and is Scanning the Again Same Scanning Line as above (at the Time of Display Condition of Drawing 15 (B)) display 1 this scanning-line top -- stripe pixels Ri and Li of the parallax images RS and LS L1R2L3R4 -- the 2nd compared with .... Stripe image 11B is displayed. It is the space light modulation element 2 to coincidence. On the correspondence scanning line, it is Point G. Open, close, open, and the close .... The light transmission section and the optical protection-from-light section are repeated in sequence. The 2nd Parallax barrier pattern 2B is formed (the light transmission section and the optical protection-from-light section have a reverse relation mutually by this 2nd parallax barrier pattern 2B and 1st parallax barrier pattern 2A). this time -- a right eye AR -- stripe pixel R2R4R6 -- the parallax image for right eyes which is .... and was constituted -- incidence -- carrying out -- a left eye AL -- stripe pixel L1L3L5 -- only the parallax image for left eyes which consisted of .... can carry out incidence, and can carry out stereoscopic vision similarly.
[0111] this 2 displaying the display condition of ** by time sharing by turns by the high-speed frame rate -- a right eye -- stripe pixel R1R2R3R4 -- all the parallax images RS that consisted of .... a left eye -- stripe pixel L1L2L3L4 -- all the parallax images LS that consisted of .... observe, respectively -- having -- display 1 A high-definition solid image can be observed without dropping display resolution.
[0112] The resolving power of the image which appears from an eye on either side in the conventional solid image display approach is one half of the display resolution of the display to be used. It is [as opposed to / at this operation gestalt / it] 2 although it was falling. It is a twice as many highly minute image as this.
[0113] It is the display 1 of this operation gestalt by drawing 16. Space light modulation element 2 A switch of a display is explained in more detail. Here, it is drawing 3. The case where it is driving by the no interlace using the shown circuitry is shown. drawing of the inside of drawing, and the left -- display 1 a display condition -- being shown -- right drawing -- space light modulation element 2 The parallax barrier pattern to display is shown.
[0114] Drawing 16 (A) and (C) It is a display 1, respectively. A screen is the 1st. Stripe image 11A and the 2nd Stripe image 11B The condition of having switched completely is shown and it is drawing 16 (B). It is the 5th while performing the middle scan. The display condition of the time of day which finished scanning the scanning line Y5 is illustrated.
[0115] drawing 16 (A) it is shown -- as -- a certain time of day -- setting (time of day which the scan of a full screen finished) -- display 1 **** -- R1L2R3L4 -- the 1st located in a line with .... Stripe image 11A it displays over the whole surface -- having -- space light modulation element 2 **** -- opening-and-closing opening and closing -- the 1st with which the ... and stripe-like pattern was located in a line Parallax barrier pattern 2A is displayed.
[0116] and the degree from this condition -- the 1st the scanning line Y1 -- choosing -- this display 1 a scanning-line Y1 top -- L1R2L3R4 -- the 2nd located in a line with .... while displaying the applicable part of a stripe image -- space light modulation element 2 a scanning-line Y1 top -- the open-close-open close -- the 2nd located in a line with .... The applicable part of parallax barrier pattern 2B is displayed synchronizing with the scanning line. They are the scanning lines Y1 and Y2 about this.... It repeats successively and is the 5th. The display condition of the time of day which finished scanning the scanning line Y5 is drawing 16 (B). It is a condition.
[0117] At this operation gestalt, it is a display 1 to this appearance. Space light modulation element 2 For every scanning line, a synchronization is taken and it indicates by drive. and the condition of having finished displaying all the scanning lines -- drawing 16 (C) it is -- display 1 **** -- drawing 16 (A) The 1st shown Stripe image 11A The 2nd which complements mutually and suits Stripe image 11B It is displaying. and drawing 16 (A) the stripe pixels R1, R3, and R5 of the No. odd eye of the right parallax image RS -- having displayed .... receiving -- drawing 16 (C) **** -- the stripe pixels R2, R4, and R6 of the No. even eye of the right parallax image RS .... is displayed. moreover, drawing 16 (A) the even-numbered stripe pixels L2 and L4 of the left parallax image LS, and L6 -- having displayed .... receiving -- drawing 16 (C) a condition -- the odd-numbered stripe pixels L1, L3, and L5 of the left parallax image LS .... is displayed.
[0118] After a series of scans (rewriting display of all the scanning lines) are completed by this, it means that the right parallax image RS and the left parallax image LS were displayed on all the pixels that constitute a display 1.

[0119] light modulation element 2 between this space-time since the parallax barrier pattern to form also take , switch and show the synchronization for every scanning line , it be this space light modulation element 2 . even if it mind and observe the stripe image under rewriting and after rewriting , stereoscopic vision can be carry out without produce most cross talks based on the principle of the parallax barrier method , and the high definition solid image displayed on all the pixels of a display can be see .
[0120] It sets in this operation gestalt and is a display 1. 1 Display width of face P of the stripe pixel which constitutes a right-and-left parallax image in a pixel It is made in agreement and, moreover, is the space light modulation element 2. 1 of the screen Although the pixel was made to correspond to the display width of face of the light transmission section and the optical protection-from-light section of a parallax barrier pattern Formation of a parallax barrier pattern is not what is restricted to this. For example, as shown in drawing 17, it is the display width of face P of a stripe pixel. Display 1 It is the space light modulation element 2 about display width-of-face B' of the light transmission section and the optical protection-from-light section of a parallax barrier pattern to also make it correspond to two or more pixels. It can also be made to correspond to two or more pixel width of face. And this is the display width of face P which it can choose mutually-independent and is a stripe pixel. Display 1 1 It is made the width of face of a pixel and is the space light modulation element 2 about display width-of-face B' of the light transmission section and the optical protection-from-light section of a parallax barrier pattern. It can also be made to correspond to two or more pixel width of face. This is applicable to all the operation gestalten of this invention.
[0121] Drawing 18 is the operation gestalt 7 of the solid image display device of this invention. It is the explanatory view of the solid image display approach. The configuration of the equipment of this operation gestalt is the operation gestalt 6 fundamentally. It is the same. However, operation gestalt 6 It sets and is a display 1. It is stripe image 11A to the whole surface. Or 11B While displaying, it is the space light modulation element 2 by scanning-line synchronization. It is a display 1 by forming parallax barrier pattern 2A or 2B all over the screen. The solid image was displayed over the whole screen surface. On the other hand, this operation gestalt is a display 1 so that the window of a computer may be opened. A solid image can be displayed only on the part on the screen. This point is the operation gestalt 6. It differs.
[0122] It is a display 1 as this operation gestalt is shown in drawing on the left of drawing 18 with the observation condition input means 9 at the beginning of actuation of a solid image display device. The range (field) 41 which displays a solid image on the screen is inputted. And a stripe image is displayed only on the field and it is 2 in other fields. A dimension image (non-stripe image) is displayed. It is the space light modulation element 2 to coincidence. Upper display 1 A parallax barrier pattern is formed only in the field 42 corresponding to a field 41, and other fields are changed into a light transmission condition. In the part as which a solid image is observed by this from a stripe image only to the desired field 41, and the stripe image is not displayed, it is 2. A dimension image is observable.
[0123] In this operation gestalt, the display of the solid image to a field 41 top is faced, and it is the operation gestalt 6. It is a display 1 as explained. And space light modulation element 2 It displays by taking a synchronization for every scanning line. drawing 18 -- the field 41 whole surface -- a stripe pixel -- L -- one R2L3R4L5R6 -- the 2nd located in a line with .. Stripe image 11B From the condition of having displayed It moves to the next image display and is the 4th. A stripe pixel is R1L2R3L4R5 L6 from the scanning line to a field 41 one by one.. The 1st located in a line Stripe image 11A It switches and displays. It synchronizes with this scanning line at coincidence, and is the space light modulation element 2. The light transmission section and the optical protection-from-light section of an applicable part are switched, and it goes, and is this The 5th The moment of finishing scanning to the scanning line Y5 is illustrated typically.
[0124] This operation gestalt is a display 1. While displaying a solid image on a part and being able to perform the mixture display of a solid image and a non-solid image Display 1 The stripe image 11 and the space light modulation element 2 which are displayed on a field 41 Since a synchronization is taken and the parallax barrier pattern formed in a field 42 is displayed for every scanning line Even if it observes the stripe image displayed partially, stereoscopic vision can be carried out without producing a cross talk based on the principle of the parallax barrier method.
[0125] The magnitude of the viewing area 41 of the solid image partially displayed in this operation gestalt is a display 1. What is necessary is just in display screen size, and the two-dimensional display position on the display screen can also be suitably chosen in the display screen.
[0126] In addition, the width of face P, number, and display 1 of a stripe pixel The field which displays a stripe

image in a top is the component of a stripe image, and is width-of-face B' of the opening and the protection-from-light section of a parallax barrier pattern, and the space light modulation element 2. The field which forms a PARARARAKKUSU barrier pattern in a top is the component of an opening pattern.
[0127] In addition, it is the operation gestalt 1 in this case. It is a display 1 similarly. Space light modulation element 2 It is also possible to take and drive a synchronization for every pixel.
[0128] Drawing 19 is the operation gestalt 8 of the solid image display device of this invention. It is the explanatory view of the solid image display approach. The configuration of the equipment of this operation gestalt is the operation gestalt 7 fundamentally. It is the same. However, this operation gestalt is the operation gestalt 7. A different point is usual 2 at this operation gestalt. The field 1 which displays a dimension image (non-stripe image), i.e., a display, It is the point which always forms a parallax barrier pattern also to fields other than field 41. It is a display 1 like the operation gestalt 7 also here. The case where a solid image is displayed only on the field 41 on the screen is explained.
[0129] It is drawing 19 (A) first. It explains. this operation gestalt -- setting -- drawing 19 (A) it is shown in left drawing -- as -- display 1 **** -- the 1st The scanning line Y1 to the 3rd 2 [usual until the scanning line Y3] A dimension image is displayed. this time -- drawing 19 (A) it is shown in the right figure -- as -- space light modulation element 2 **** -- display 1 the timing which scans each scanning line -- a synchronization -- taking -- each pixel on each scanning line -- opening-and-closing opening and closing -- the 1st of the shape of a stripe, ..., Parallax barrier pattern 2A is displayed over the whole scanning line.
[0130] and the 4th the time of scanning the scanning line Y4 -- display 1 **** -- display 1 The 1st A pixel X1 to the 6th .. (in practice -- R -- although it is .. 1L2R3L4R5 L6, it is outlining like the point) is displayed. up to a pixel X6 -- the stripe pixel RLRLRL -- the 7th the 12th from a pixel X7 -- pixel X12 ****** -- 2 The image corresponding to a part for this picture element part of a dimension image is displayed.
[0131] and space light modulation element 2 **** -- this display 1 the timing of the scanning line -- a synchronization -- taking -- the 4th the scanning line Y4 -- the 1st the 12th from a pixel X1 -- pixel X12 up to -- all pixels -- opening-and-closing opening and closing -- the 1st of ... Parallax barrier pattern 2A is displayed. They are same scan and display The 5th The scanning line Y5 to the 8th The condition of having carried out to the scanning line Y8 is drawing 19 (A). It is in the condition to illustrate.
[0132] Next, drawing 19 (B) It explains. Drawing 19 (A) The 8th After the scan to the scanning line Y8 finishes, it is the 1st again. It scans from the scanning line Y1. this time -- the 1st The scanning line Y1 to the 3rd the scan to the scanning line Y3 -- display 1 **** -- usual 2 [same with a front] although a dimension image is displayed -- space light modulation element 2 **** -- the open-close-open close -- the 2nd of ... Parallax barrier pattern 2B is displayed over the whole scanning line. and the 4th the time of scanning the scanning line Y4 -- the 1st -- pixel X1 to the 6th up to a pixel X6 -- the stripe image LRLRLR .. (in practice -- L -- one R2L3R4L5R6 -- although it is .., it is outlining like the point) -- displaying -- the 7th the 12th from a pixel X7 -- pixel X12 ****** -- above 2 The image corresponding to a part for this picture element part of a dimension image is displayed.
[0133] and this display 1 the timing of the scanning line -- a synchronization -- taking -- space light modulation element 2 The 4th the scanning line Y4 -- the 1st the 12th from a pixel X1 -- pixel X12 up to -- all pixels -- the open-close-open close -- the 2nd of ... Parallax barrier pattern 2B is displayed. And they are same scan and display The 5th The condition of having carried out to the scanning line Y5 is drawing 19 (B). It is in the shown condition.
[0134] And the condition of carrying out by repeating this scan and display, and having finished scanned and displaying the last scanning line Y8 is drawing 19 (C). It is in the shown condition.
[0135] It sets to the field 41 which displays this solid image, and is the operation gestalt 1. After a series of scans (rewriting display of all the scanning lines) are completed similarly, the right parallax image RS and the left parallax image LS will be displayed on all the pixels in a field 41. Therefore, this operation gestalt can display a high definition solid image with few cross talks of a right-and-left image in the three dimentional display field 41 while being able to perform the mixture display of a solid image and a non-solid image.
[0136] Furthermore, this operation gestalt is the space light modulation element 2. Since a parallax barrier pattern is displayed on the whole surface, it is the operation gestalt 7. A barrier drive circuit becomes easy.
[0137] Although the old operation gestalt was the solid image display device of a no interlace drive, it is also possible to constitute the solid image display device of this invention using an interlace drive.
[0138] Drawing 20 is the operation gestalt 9 of the solid image display device of this invention. It is the

explanatory view of the solid image display approach. Drawing 20 (A) - (D) Drawing which is each the left is a display 1. About a display condition, right drawing is the space light modulation element 2, respectively. The parallax barrier pattern to form is shown. The configuration of this operation gestalt is the operation gestalt 6 fundamentally. It is the same. This operation gestalt is the operation gestalt 6. A different point is a point which shows the solid image using interlace scanning, and others are the same.

[0139] Drawing 20 (A) and (D) It is the operation gestalt 6, respectively. Drawing 16 (A) and (C) It is the same as a condition. Drawing 20 (B) It sets in this operation gestalt and is a display 1. And space light modulation element 2 The condition of having finished scanning the odd number scanning line is shown, and it is drawing 20 (C). Two among the even number scanning lines The condition of having finished scanning Rhine (scanning lines Y2 and Y4) is shown.

[0140] Drawing 20 (A) So that it may be shown at a certain time of day (time of day which the scan of a full screen finished) display 1 **** -- a stripe pixel -- RLRL -- the 1st located in a line with .... (in practice -- R1L2R3L4 -- it is outlining like the point although it is ..) Stripe image 11A Display 1 It is displayed over the whole surface. space light modulation element 2 **** -- opening-and-closing opening and closing -- the 1st of the shape of a stripe, ..., Parallax barrier pattern 2A is displayed.

[0141] And it is the odd number scanning line, for example, the 1st, next. The scanning line Y1 is chosen. display 1 The 1st the part of the scanning line Y1 -- a stripe pixel -- LRLR -- the 2nd located in a line with .... (in practice -- L1R2L3R4 -- it is outlining like the point although it is ..) Stripe image 11B While displaying an applicable part space light modulation element 2 The 1st the part of the scanning line Y1 -- the open-close-open close -- the 2nd of the shape of a stripe located in a line with ..... The applicable part of parallax barrier pattern 2B is displayed. Thus, display 1 Space light modulation element 2 For every scanning line, a synchronization is taken and it indicates by drive. the thing illustrating the display condition in the time of day which finished scanning all the scanning lines for this repeatedly to the odd number scanning line one by one -- drawing 20 (B) it is .

[0142] and a degree -- the even number scanning line and the 2nd the scanning line Y2 chooses -- having -- display 1 The 2nd the part of the scanning line Y2 -- a stripe pixel -- LRLR -- the 2nd located in a line with .... Stripe image 11B while displaying an applicable part -- space light modulation element 2 The 2nd the part of the scanning line Y2 -- the open-close-open close -- the 2nd located in a line with ..... The applicable part of parallax barrier pattern 2B is displayed. this -- the even number scanning line -- receiving -- one by one -- repeating -- the 4th the thing illustrating the display condition of the time of day which finished scanning the scanning line Y4 -- drawing 20 (C) it is .

[0143] and the condition of having finished scanned and displaying all the even number scanning lines -- drawing 20 (D) it is -- display 1 **** -- drawing 20 (A) The 1st shown Stripe image 11A The 2nd which complements mutually and suits Stripe image 11B It is displaying. moreover, space light modulation element 2 **** -- the 2nd Parallax barrier pattern 2B is displayed.

[0144] After a series of scans (rewriting display of all the scanning lines) are completed by this, it means that the right parallax image RS and the left parallax image LS were displayed on all the pixels of a display 1.

[0145] Stereoscopic vision can be carried out without producing a cross talk based on the principle of the parallax barrier method, even if an observer observes under rewriting and the rewritten stripe image through this parallax barrier pattern, since the parallax barrier pattern also takes and shows the synchronization for every scanning line at this time, and it is a display 1. The solid image displayed on all pixels can be seen.

[0146] Thus, when it displays using an interlace drive, the odd number scanning line and the even number scanning line can be displayed by turns for every field, and it is a display 1. Space light modulation element 2 It carries out, and even if a display speed uses a late liquid crystal device etc. somewhat, the display of a high definition solid image without a flicker is attained.

[0147] This method of presentation is the operation gestalt 7. Operation gestalt 8 It is applicable also to the approach of displaying a solid image on the part on the screen of the explained display.

[0148] Moreover, this interlace drive is the operation gestalt 1. It is applicable also to the approach of taking and displaying a synchronization for every pixel.

[0149] Drawing 21 is the important section schematic diagram of the operation gestalt 10 of the solid image display device of this invention. Moreover, drawing 22 is the explanatory view of the solid image display approach of this operation gestalt. In addition, display 1 of this operation gestalt And space light modulation element 2 Arrangement etc. is the operation gestalt 6. It is the same. Moreover, it is the operation gestalt 1 also

to this operation gestalt. It is not illustrating, although there are the observation condition input means 9 and the parallax image source 15 similarly. At this operation gestalt, it is a display 1. Space light modulation element 2 In the case of an old operation gestalt, 90 degrees rotated and the direction of the scanning line and the data line is set up. That is, with this operation gestalt, it scans in the direction of a vertical.
[0150] The method of presentation is explained. Drawing 22 (A) It sets at a certain time of day so that it may be shown, and it is the 1st. The scanning line Y1 is chosen and it is a display 1. The 1st The 1st on the scanning line Y1 The stripe pixel R1 of the right parallax image RS is altogether displayed from a pixel X1 to the last pixel X8. light modulation element 2 between this space-time **** -- drawing 22 (B) it is shown -- as -- space light modulation element 2 The 1st The 1st on the scanning line Y1 The optical protection-from-light section is formed from a pixel X1 to the last pixel X8. Next, the 2nd The scanning line Y2 is chosen and it is the 2nd to a display 1. The 1st on the scanning line Y2 The stripe pixel L2 of the left parallax image LS is altogether displayed from a pixel X1 to the last pixel X8, and it synchronizes with this, and is the space light modulation element 2. The 2nd The light transmission section is formed in all the pixels on the scanning line Y2.
[0151] The same drive is performed one by one and all displays are performed. At drawing 22, it is the 7th. The condition of having finished scanning the scanning line Y7 is shown.
[0152] At this operation gestalt, it is a display 1 to this appearance. Space light modulation element 2 A synchronization is taken for every scanning line Yi, and it is stripe image 11A. Or 11B And by forming parallax barrier pattern 2A or 2B, an observer can see a solid image with few cross talks.
[0153] If the scanning line is set as a lengthwise direction like this operation gestalt so that clearly from drawing The stripe image and parallax barrier pattern which are displayed on each scanning line are continued for all the pixels on the scanning line. Parallax images RS and LS on either side 1 Since it is either the stripe pixel Ri or Li and the light transmission section of **, or the optical protection-from-light section The one scanning line is accompanied like an old operation gestalt, and it is RLRLRL about the applicable part of a stripe image... It is not necessary to arrange and display by turns or to display [do not need to form the optical protection-from-light section and the light transmission section, and] them by turns, and a display circuit can be simplified.
[0154] in addition -- this operation gestalt -- image-processing means 3 from -- although the case where it drove with a synchronizing signal was shown -- the drive approach -- display drive circuit 4 a synchronizing signal is generated -- making -- barrier drive circuit 5 taking the timing of a drive **** -- Y The various drive approaches, such as taking a synchronization with a driver, can be used.
[0155] At this operation gestalt, it is the 1st. Although the same drive approach as the no interlace sequentially scanned from the scanning line Y1 is used, after displaying the odd number scanning line, the drive approach like the interlace which displays the even number scanning line can also be used.
[0156] Drawing 23 is the important section schematic diagram of the operation gestalt 11 of the solid image display device of this invention. This operation gestalt is the operation gestalt 6. It is made to develop, an observer's view location is detected, it responds to an observer's view location, and they are a parallax barrier pattern and a display 1. It is the operation gestalt which controls a relative location with the stripe image to display, and could be made to carry out stereoscopic vision over the large range.
[0157] the inside of drawing, and 30 -- operation gestalt 3 It is the explained observation condition detection means, and an observer's image is photoed with a camera, an image processing extracts the image of an observer's eye from this input image, and an observer's view location is detected. 9 It is a ****** condition input means and input an observer's view location by the manual according to a case. 44 -- the operation means of an image location and a barrier location -- it is -- the observation condition detection means 30 or observation condition input means 9 from -- view positional information -- being based -- a parallax barrier pattern and display 1 the optimal relative physical relationship of the stripe image to display -- calculating -- the barrier positioning control circuit 45 and image-processing means 3 A signal is outputted. The barrier positioning control circuit 45 is based on this signal, and is the barrier drive circuit 5. It controls and is the space light modulation element 2. A upwards suitable parallax barrier pattern is formed.
[0158] 81 82 Space light modulation element 2 X It is a driver. X A driver 81 drives odd pixels and is X. A driver 82 drives even pixels.
[0159] In addition, a display 1 and the space light modulation element 2 Arrangement etc. is the operation gestalt 6. It is the same.
[0160] An operation of this operation gestalt is explained. drawing 23 -- setting -- the observation condition detection means 30 or observation condition input means 9 An observer's view positional information is

inputted into the operation means 44 of an image location and a barrier location. from -- The operation means 44 of an image location and a barrier location is based on this view positional information, and is a display 1. The stripe image 11 and the space light modulation element 2 to display The optimal relative location of the parallax barrier pattern to form, for example, the light transmission section, is calculated. The barrier positioning control circuit 45 and image-processing means 3 A signal is outputted, the barrier positioning control circuit 45 is based on this signal, and it is the barrier drive circuit 5. It controls and is the space light modulation element 2. A parallax barrier pattern is formed in the upper, optimal location.

[0161] It is the image-processing means 3 to coincidence. It is based on a signal from the operation means 44 of an image location and a barrier location, and is a display 1. A stripe image is displayed on the upper, optimal location.

[0162] Drawing 24 is the display 1 in the case of driving by no interlace. A display condition (drawing 24 (A)) and space light modulation element 2 The parallax barrier pattern (drawing 24 (B)) formed is shown.

[0163] And drawing 24 (C) When an observer moves to a longitudinal direction, the view location is detected, and it is the space light modulation element 2. It is the location of the parallax barrier pattern to form to a longitudinal direction 1 The condition of driving so that pixel migration may be carried out is shown. In addition, all drawing 24 is the 5th. The display condition of the time of day which finished scanning the scanning line Y5 is expressed typically.

[0164] It sets in this operation gestalt and is a display 1. Width of face P of each stripe pixel to display Display 1 It is set as width of face of 1 pixel, and is the space light modulation element 2. It is the space light modulation element 2 about width-of-face B' of the light transmission section of the parallax barrier formed, or the optical protection-from-light section. 2 It is set as the pixel width of face of **.

[0165] Drawing 25 is an explanatory view which moves a parallax barrier pattern in this operation gestalt corresponding to migration of a view location. drawing -- the 1st The relation between the stripe image and parallax barrier pattern in a certain part meeting the scanning line Y1, and an observer's view location is shown.

[0166] It is a display 1 when an observer moves in this operation gestalt. The stripe image to display is fixed and it is the space light modulation element 2. The case where the location of the light transmission section of the parallax barrier pattern to form is controlled in the optimal location is explained. Drawing 25 (A) An observer looks at the right stripe pixel R3 through the light transmission section 51 by the right eye AR, looks at the left stripe pixel L2 through the light transmission section 51 by the left eye AL, and is observing the solid image so that it may be shown.

[0167] This condition to drawing 25 (B) An observer's eye is lateral A'R and A'L so that it may be shown. Suppose that it moved. Space light modulation element 2 Light transmission section 51' of the parallax barrier pattern to form Space light modulation element 2 Only width of face Pb of 1 pixel moves and forms in a longitudinal direction. To the appearance explained with said operation gestalt, the drive of this scanning line is a display 1. It is driving synchronizing with the scan. An observer is right eye A'R by this. The right stripe pixel R3 is seen through light transmission section 51', and it is light transmission section 51' at left eye A'L. It lets it pass, the left stripe pixel L2 is seen, and a solid image can be observed.

[0168] At this time, it is the space light modulation element 2. It is the space light modulation element 2 about the light transmission section or the optical protection-from-light section of a parallax barrier pattern to form. If constituted from two or more pixels, since a parallax barrier pattern is delicately movable, it is convenient.

[0169] Moreover, contrary to the upper example of explanation, when a view location moves, the location of the light transmission section of a parallax barrier pattern remains as it is, and it is a display 1. The location of the stripe image to display may be shifted to a longitudinal direction. At this time, it is a display 1. It is a display 1 about the stripe pixel to display. It is convenient, if it constitutes so that it may display by two or more pixels. That is, display 1 Display width of face P of the stripe pixel to display Display 1 It considers as the width of face of two or more pixels.

[0170] as mentioned above , since an observation condition detection means detect an observer view location automatically , control the display position of a stripe image , and the formation location of a parallax barrier pattern and he be try to always observe a parallax image on either side correctly from an observer view location even if an observer view move in this operation gestalt , the range which can observe a stereoscopic model become very large . That is, this operation gestalt is at least 1 of the component of a stripe image, and the component of a parallax barrier pattern by the signal from an observation condition detection means or an observation condition input means. It is moving in the range which controls **, follows migration of an

observer's view location, and can observe a stereoscopic model.
[0171] In addition, while acquiring distance information by the principle of triangulation using two or more cameras as an observation condition detection means 30, the approach of detecting an observer's view location can also be used.
[0172] Moreover, it is also possible to form the magnetic field in an observer's perimeter, to make an observer's head equip with a magnetic sensor, and to use the output from this sensor. Moreover, an observer is able to control an adjustment switch etc., observing a display image besides establishing an observation condition detection means as mentioned above.
[0173] Drawing 26 is the important section schematic diagram of the operation gestalt 12 of the solid image display device of this invention. The configuration of equipment is a display 1. Space light modulation element 2 A drive circuit is removed and it is the operation gestalt 6. It is the same. In addition, the observation condition input means 9 and the parallax image source 15 are not illustrated. This operation gestalt is the operation gestalt 6. It receives and is a display 1. Space light modulation element 2 X A driver and Y It is a driver, respectively 2 They are ****** and the display screen 2 The points which divide and carry out a display drive differ. for example, the liquid crystal display of VGA (640 x480 pixel) -- display 1 And space light modulation element 2 ****** -- the case where it uses -- these -- 320 Y corresponding to the scanning line of a book Driver 71a and 71b And 72a and 72b 2 It divides into the part of **, respectively and drives into it. this operation gestalt -- a no interlace -- driving -- **** -- drawing 27 (A) and (B) Display 1 of this operation gestalt Space light modulation element 2 The display condition is shown.
[0174] a certain scan time of day -- setting -- display 1 **** -- image-processing means 3 from -- a picture signal is inputted based on a synchronizing signal, and the stripe image created from the parallax image on either side is displayed. Drawing 27 (A) It is Y then. Driver 71a and 71b The 2nd Scanning lines Ya2 and Yb2 The condition of having finished scanning is illustrated.
[0175] The method of presentation is explained. a certain time of day (time of day which the scan of a full screen finished) -- display 1 a top -- a stripe pixel -- R1L2R3L4 -- the 1st located in a line with .... Stripe image 11A Suppose that it is displaying over the whole display surface. again -- Y Driver 71a and 71b The 1st The scanning lines Ya1 and Yb1 the time of choosing and scanning -- a stripe pixel -- L1R2L3R4 -- the 2nd located in a line with .... Stripe image 11B An applicable part is displayed. Subsequently, the 2nd Scanning lines Ya2 and Yb2 It chooses and scans and is the 2nd. Stripe image 11B An applicable part is displayed. Drawing 27 (A) The condition at this time is illustrated.
[0176] Space light modulation element 2 A parallax barrier pattern is formed similarly. namely, -- a certain time of day (time of day which the scan of a full screen finished) -- space light modulation element 2 **** -- the protection-from-light section and a translucent part -- opening-and-closing opening and closing -- the 1st of the shape of a stripe located in a line with ... Parallax barrier pattern 2A is displayed. and -- again -- Y Driver 72a and 72b The 1st The scanning lines Ya1 and Yb1 the time of being chosen and scanned -- the protection-from-light section and a translucent part -- the open-close-open close -- the 2nd of the shape of a stripe located in a line with ... Parallax barrier pattern 11B It displays. Subsequently, the 2nd Scanning lines Ya2 and Yb2 A selection **** scan is carried out and it is the 2nd on it. Parallax barrier pattern 11B It displays. Drawing 27 (B) The condition at this time is illustrated.
[0177] At this time, it is a display 1. Space light modulation element 2 Y Driver 71a and 71b And 72a and 72b The 2nd The scanning line Ya2 and Yb2 Image-processing means 3 A synchronization is taken and it indicates by drive. That is, it sets in this operation gestalt and is 4. The scanning line of a book is scanned at this time of day. For the reason, the data line (X driver) is also Y. It corresponds to a driver and is 2, respectively. **********.
[0178] thus, display 1 Space light modulation element 2 the display screen -- 2 dividing and carrying out a display drive -- 2 a twice as many drive speed as this -- a display -- it can carry out -- operation gestalt 6 etc. -- it compares and solid image display with still few flickers becomes possible.
[0179] At this operation gestalt, it is a display 1. Space light modulation element 2 Although the case where took a synchronization and it indicated by drive for every scanning line was explained, it is the operation gestalt 1. 1 used It is also possible to use the approach of taking a synchronization and indicating by drive for every pixel.
[0180] Drawing 28 is the explanatory view of the display condition of the operation gestalt 13 of the solid image display device of this invention. Drawing 28 (A) and (B) It is a display 1, respectively. Space light

modulation element 2 The display condition is illustrated. The configuration of this operation gestalt is the operation gestalt 1 fundamentally. It is the same. However, at this operation gestalt, it is a display 1. Space light modulation element 2 1 In case a synchronization is taken and it indicates by drive for every pixel, it is the space light modulation element 2. It differs in that the optical protection-from-light section (close) is indicated by precedence over several pixels.

[0181] display 1 **** -- Drawing 28 (A) To the first scanning line Y1, so that it may be shown a stripe pixel -- R -- the 1st located in a line with .... (drawing -- RLRLRL -- it is written as ...) 1L2R3L4R5 L6 Stripe image 11A While displaying an applicable part space light modulation element 2 The 1st the scanning line Y1 -- drawing 28 (B) it is shown -- as -- opening-and-closing opening-and-closing opening and closing -- the 1st which arranged the ... and light protection-from-light section and the light transmission section in by turns The applicable part of stripe barrier pattern 2A is displayed. And it is the 2nd in the case of a no interlace drive. The scanning line Y2 is chosen and it is the 1st. It is the 1st like the scanning line. Stripe image 11A An applicable part and the 1st The applicable part of parallax barrier pattern 2A is displayed, this is repeated successively, and it is the 1st to the whole display screen. Stripe image 11A is displayed. It is this The 1st A solid image is observable by observing through parallax barrier pattern 2A.

[0182] It is the 5th as the scans of all finish it as drawing 28. The scanning line Y5 is chosen and it is the 7th [the]. The pixel data of a pixel X7 are a display 1. It is displayed (drawing 28 (A)) and is the space light modulation element 2. The display condition that the parallax barrier pattern is formed (drawing 28 (B)) is shown typically.

[0183] It sets in this operation gestalt and is drawing 28 (B) at this time. It is the space light modulation element 2 so that it may be shown. The 5th It is the 7th on the scanning line Y5. The optical protection-from-light section (close) is indicated by precedence over several pixels (here 8th pixel X8- on the 5th scanning line the 10th pixel 3 of X10 pixel) preceded with a pixel X7. space light modulation element 2 The 5th the 10th of the scanning line Y5 -- pixel X10 up to -- pixel data are displayed as the optical protection-from-light section.

[0184] Thus, they are a stripe image and a parallax barrier pattern corresponding to it 1 The cross talk of a stripe pixel on either side can be further reduced by making several pixels (here, it being 3 pixel) indicate the optical protection-from-light section (close) by precedence over taking a synchronization and indicating by drive for every pixel.

[0185] It is especially the display 1. Space light modulation element 2 When the liquid crystal panel of a different property is used, even if the drive rates of the 1 scanning line of a liquid crystal panel differ, the cross talk of a right-and-left image can be reduced. Conversely, if it says from the point of a drive of a liquid crystal panel, the drive margin for taking the synchronization of each panel and indicating by drive can be enlarged.

[0186] of course, except for this operation gestalt having shown -- 1 Operation gestalt 6 which takes and drives a synchronization for every scanning line etc. -- what is necessary is to be able to apply and just to indicate the protection-from-light section (close) by precedence over the number scanning line in that case

[0187] Drawing 29 is the important section schematic diagram of the operation gestalt 14 of the solid image display device of this invention. Space light modulation element 2 which forms the parallax barrier in an old operation gestalt Display 1 As opposed to having constituted so that it might arrange ahead (observer side) and a solid image might be observed At this operation gestalt, it is the space light modulation element 2. Display 1 It arranges back. The points which constitute equipment so that a solid image may be observed differ by forming the opening pattern which has predetermined light transmission section (opening) and optical protection-from-light section, and controlling the transparency part of the light from a back light (light source means) 21.

[0188] The configuration of this equipment is explained. They are C and a display 1 about O and observation distance in an observer's both-eyes spacing (base length). Spacing with the space light modulation element 2 which forms the parallax barrier D, They are Bap and a display 1 about the width of face of opening of an opening pattern. If pixel spacing (pixel width of face) of the stripe image to display is set to Prea The formula (1) and (2) which were set and explained It sets. B' Prea It is Bap about P. That what is necessary is just to replace, if the following relation is satisfied, stereoscopic vision will be acquired. Said operation gestalt 1

[0189]

D=Bap-C/(O+Bap) ---------- (5) Prea=Bap- (C-D) / C ---------- (6) -- since observation width of face has the breadth of finite in an observation location still in fact, these amounts of many are changed a little, and are set up.

[0190] The solid image display approach of this operation gestalt is explained. Stripe image 11from the parallax image source 15 of drawing 29 A Or 11B It forms and is a display 1. The approach of displaying is the operation gestalt 1. It is the same. On the other hand, it is the image-processing means 3. Synchronizing with the output of the above-mentioned stripe image data, opening pattern 2A or the pixel data of 2B is inputted also into the opening pattern drive circuit 46, and it is the space light modulation element 2. Aperture width Bap Stripe-like opening pattern 2A or 2B which formed the optical protection-from-light section and the light transmission section by turns is displayed.
[0191] The light injected from the back light 21 is the space light modulation element 2. The light transmission section is passed and it is a display 1. The upper stripe pixel Ri is illuminated and incidence is carried out to an observer's right eye AR. It is the space light modulation element 2 similarly. The light from a back light 21 which passed the light transmission section is a display 1. The upper stripe pixel Li is illuminated and incidence is carried out to an observer's left eye AL. Thereby, an observer will observe each parallax image by each eye, and can do stereoscopic vision of the stripe image 11.
[0192] At this time, it is a display 1. Space light modulation element 2 As a drive circuit, it is drawing 3. The shown circuitry is used. Thereby, it is a display 1. Space light modulation element 2 1 A synchronization can be taken and driven for every pixel, and since it always synchronizes and a stripe image and the opening pattern corresponding to it are displayed, the cross talk of a parallax image on either side can be reduced.
[0193] Of course, it is 1 besides this operation gestalt having shown. The method of presentation explained with the old operation gestalt possible [also taking and driving a synchronization for every scanning line] can be used.
[0194] Moreover, drawing 30 is the perspective view of the solid image display device in this operation gestalt. This operation gestalt is constituted so that color display may be performed. In order to perform color display in this operation gestalt, it is each stripe pixel Ri and Li. 1 of a color What is necessary is just to make it correspond to a pixel. However, if the liquid crystal device of the color filter array of a well-known vertical stripe is used, in an observation location, color gap will be produced in red, green, and blue, and color reproduction will worsen. Then, it is a display 1 as shown in the partial enlarged drawing 47 of drawing 30 with this operation gestalt. Red r, green g, and blue b which has lateral stripe geometry on the front face of the liquid crystal device of a transparency form to be used The color filter was formed and good color reproduction has been obtained.
[0195] Drawing 31 is the important section schematic diagram of the operation gestalt 15 of the solid image display device of this invention. This operation gestalt uses linear Fresnel lens 48 for an old operation gestalt further, and constitutes equipment. drawing 31 (A) and (B) it is shown -- as -- display 1 Space light modulation element 2 Whichever is sufficient as a context, and the principle of its operation and display gets having explained until now, and comes out.
[0196] The configuration of this operation gestalt is explained. It sets in an old operation gestalt and is a display 1. Space light modulation element 2 Many elements are a formula (1) and (2). Or a formula (5) and (6) It is connected and is a display 1. Pixel width of face and space light modulation element 2 It differed from pixel width of face.
[0197] A pixel pitch is adjusted by using the linear Fresnel lens (cylindrical Fresnel lens) of the single dimension which has chisel power horizontally in this operation gestalt, and it is a display 1. Space light modulation element 2 It enables it to use the liquid crystal device of the same specification. Since it is the same as that of an old operation gestalt about the principle and the drive approach of stereoscopic vision, explanation is omitted.
[0198] 48 are the linear Fresnel lens (cylindrical Fresnel lens) of the single dimension which has chisel power horizontally among drawing. Drawing 31 (A) Space light modulation element 2 which forms the parallax barrier for linear Fresnel lens 48 so that it may be shown The case where it installs ahead (observer side) is explained.
[0199] They are O and a display 1 about f and an observer's both-eyes spacing (base length) in the focal distance of linear Fresnel lens 48. It is a display 1 when pixel spacing (pixel width of face) of the stripe image 11 to display is set to PLCD (this is the same as the width of face of the light transmission section and the optical protection-from-light section formed in the space light modulation element 2). Space light modulation element 2 Stereoscopic vision will be acquired if spacing d1 fills the following relation.
[0200] d1 =PLCD/(O/f) ---------- (7) It sets in this operation gestalt and is a display 1. And space light

modulation element 2 It carries out. Pixel dimension The 0.110mm(width) x0.330mm (length) same liquid crystal device is used. 1 of the color Since the pixel was made into the width of face of the width of face of a stripe pixel and the light transmission section, or the optical protection-from-light section It is set to PLCD= 0.110 mm and is C=f=500 mm about O=65 mm and observation distance in the base length. If it sets up, it will be d1= 2.5385 mm. A value is acquired. In addition, this value is tuning some finely in consideration of observation broadening.

[0201] In addition, it sets in this operation gestalt and is a display 1. Space light modulation element 2 1 Every pixel and 1 By taking and driving a synchronization for every scanning line Since a stripe image and the opening pattern corresponding to it always synchronize and are displayed in any time of day on the occasion of the display of a stripe image, the same method of presentation as an old operation gestalt can be applied, and the cross talk of a parallax image on either side can be reduced.

[0202] Drawing 32 is the important section schematic diagram of other examples of a configuration of the operation gestalt 15. This example is a display 1 about linear Fresnel lens 48. Space light modulation element 2 It arranges in between.

[0203] Drawing 33 is the optical plot plan of this example. This explains an operation of this example of a configuration. The principal point of linear Fresnel lens 48 to the 1st It is the distance by the conjugate point (an observer's right eye AR or left eye AL is located here) S and the 2nd Distance to the screen of d and the space light modulation element 2 (or display 1) is made [the distance by the conjugate point] into d' for the distance to the screen of S' and a display 1 (or space light modulation element 2). now if S= C(observation distance) = 500 mm -- f=250 mm -- coming out -- d=d' if it sets up -- the liquid crystal device with the same pixel width of face -- display 1 Space light modulation element 2 It can constitute.

[0204] However, since there is thickness of about 1.35mm and a linear Fresnel lens including a polarizing plate 2 mm, the cover glass thickness of the liquid crystal device used for this operation gestalt is the refractive index of these components 1.5 If it carries out, spacing of the principal point of a linear Fresnel lens and the screen of a liquid crystal display will be at least 2.23 mm by air conversion. It is needed. however -- using the liquid crystal device of pixel dimension 0.11 mmx0.33 mm if [this operation gestalt] C=500 mm -- above required panel spacing d1= 2.5385 mm from -- it is set to d=d'= 2.5385/2=1.2693 mm, and arrangement of actual size cannot be constituted.

[0205] Then, it is about S' and d' in this case. It doubles 2.23/1.2693= 1.7569. this time -- S = 500 mm, d = 1.2693 mm, and S'= 878.45 mm and d' = 2.23 mm becoming -- f= 318.6 mm What is necessary is just to use a Fresnel lens.

[0206] Since it constitutes in this appearance, this modification is a display 1. Space light modulation element 2 The liquid crystal device of the same specification can be used and the cost of a solid image display device can be reduced.

[0207] Compared with arranging a Fresnel lens in the front face of equipment, as furthermore shown in drawing 31 in this case, it has the effectiveness that the flash of a Fresnel lens offensive to the eye etc. can be reduced.

[0208]

[Effect of the Invention] By the above configuration, this invention has few cross talks of a parallax image on either side by switching the image display to a display, and the display of the opening pattern to a space light modulation element synchronously for every pixel which corresponds, respectively, and every corresponding scanning line using the parallax barrier method, and attains the solid image display device using the outstanding solid image display approach and outstanding it which a flicker and a Moire fringe moreover cannot produce easily.

[0209] In addition to this (3-1) The 1st A stripe image and the 2nd A stripe image and the 1st A parallax barrier pattern and the 2nd By switching the change of a parallax barrier pattern synchronously for every pixel which corresponds, respectively, and every corresponding scanning line, and displaying it at high speed, there are very few cross talks and they can recognize each of a parallax image to high resolution without lack on the whole screen surface of a display.

(3-2) With conventional equipment, since four polarizing plates are used, to there having been a problem that brightness fell by absorption of this polarizing plate, one polarizing plate can be reduced and display brightness can be raised.

(3-3) even if an observer move by control the width of face of the stripe pixel display on a display , the width of face of the light transmission section and the optical protection from light section form in a space light

modulation element , spacing of a display and a space light modulation element , or the relative location of a stripe pixel and the light transmission section , with the signal from the observation condition input means which the observation condition detection means or the observer who detect an observer view location automatically input , stereoscopic vision can always carry out good .
(3-4) With the signal from the observation condition input means which the observation condition detection means or observer who detects an observer's view location automatically inputs Use it from three or more original parallax images which constitute the parallax image information which the parallax image source has, choosing two parallax images. Or by generating two parallax images from the data which constitute this parallax image information, or interpolating or reconfigurating and creating two parallax images from at least two original parallax images which constitute this parallax image information When an observer moves, the parallax image with which view locations differ according to it is constituted appropriately, and the solid image which gives the so-called smooth "surroundings lump effectiveness" is displayed.
(3-5) Into the two-dimensional image displayed on a display, there is no cross talk and the solid image of high resolving can be displayed partially.
(3-6) By adopting an interlace drive, even if a display speed uses a late liquid crystal device etc. somewhat as a display or a space light modulation element, a high definition solid image without a flicker can be displayed.
(3-7) By constituting so that the scanning-line scan of a display and the space light modulation element may be carried out in a lengthwise direction and an image may be displayed, the drive circuit of a screen is made to a simple configuration.
(3-8) The screen of a display and a space light modulation element is divided into two or more fields of the respectively same magnitude along with the scanning line, from two or more fields, the scanning line of the same location is relatively chosen as coincidence, and it synchronizes, and a drive and by displaying, one screen can be displayed more in a short time, and the solid image display display with still few flickers is attained.
(3-9) In case a display and a space light modulation element are synchronized for every pixel and every scanning line and a stripe image and an opening pattern are displayed By preceding two or more scanning lines preceded with two or more pixels preceded with the pixel synchronized and displayed or the scanning line synchronized and displayed on this space light modulation element as the protection-from-light section, and displaying them While being able to reduce further the cross talk of a parallax image on either side, even if it uses the liquid crystal panel of a different property, a cross talk can be reduced and the drive margin of each panel can be enlarged.
(3-10) By using a linear Fresnel lens, a display and a space light modulation element can be constituted from a liquid crystal device of the same specification, and attain the solid image display device of low cost. The solid image display device using the solid image display approach and it which have at least one effectiveness of ** is attained.

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the solid image display device using the solid image display approach and it which use especially a space light modulation element as an opening pattern which controls the directivity of the light from a parallax barrier or a back light about the solid image display device which used the solid image display approach and it.

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PRIOR ART

[Description of the Prior Art] As for the solid image display method using the parallax barrier method, the technique is indicated by S.H.Kaplan (21 59 "Theory of Parallax Barriers", J.SMPTE, Vol. No. 7, pp.11- 1952). This method divides each of two or more parallax images into a stripe pixel, and is 1. On the screen of **, arrange by turns the stripe pixel which constitutes a parallax image on either side, and a stripe image is formed and displayed. Stereoscopic vision is acquired through the slit (called a parallax barrier) which has the predetermined light transmission section prepared in the location which only a predetermined distance separated from this stripe image by observing the parallax image corresponding to each eye by the eye of each right and left of an observer.
[0003] With such conventional equipment, it is this 2 like the usual television It was not able to be used as a dimension image display device.
[0004] Then, in JP,3-119889,A and JP,5-122733,A, a parallax barrier is electronically formed by a transparency form liquid crystal device etc., and the solid image display device controls a configuration, a location, etc. of a barrier stripe electronically and it was made to change is indicated. Drawing 34 is the important section schematic diagram of the solid image display device currently indicated by JP,3-119889,A. With this equipment, it is the image display side 101. Spacer 102 of thickness d Electronic formula parallax barrier 103 which minds and consists of a transparency form liquid crystal display component It arranges. image display side 101 **** -- 2 Two or more parallax images picturized a direction or from many are divided into a vertical stripe pixel, respectively. It displays as a stripe image which arranged the stripe pixel of two or more of these parallax images in predetermined sequence by turns, and constituted it. on the other hand -- electronic formula parallax barrier 103 **** -- XY address -- microcomputer 104 etc. -- specifying by the control means -- electronic formula parallax barrier 103 A longwise barrier stripe is formed in the location of the arbitration on the screen. According to the principle of said parallax barrier method, stereoscopic vision is made possible.
[0005] It sets to this equipment and is 2. In case a dimension image (non-solid image) display is performed, it is the electronic formula parallax barrier 103. It is 2 by changing into a transparent and colorless condition over the whole region of an image display field, without forming a barrier stripe. Dimension image display is performed. Usual 2 which was not made by the solid image display method using the conventional parallax barrier method by this Coexistence with dimension image display is realized.
[0006] Drawing 35 is the important section schematic diagram of the liquid crystal panel display currently indicated by JP,5-122733,A and the solid image display device constituted by the electronic formula barrier. this solid image display device -- 2 Liquid crystal layers 115 and 125 of ** respectively -- 2 Polarizing plates 111 and 118 of ** 121 and 128 -- inserting -- liquid crystal layer 115 An image display means and liquid crystal layer 125 It is made the configuration made into electronic formula barrier means forming. [and] It also sets to this equipment and is 2. It is 2 by stopping formation of a barrier stripe in the liquid crystal layer 125, and changing into a transparent and colorless condition over the whole region of an image display field, in case dimension image display is performed. Dimension image display is performed and it is usual 2. Coexistence with a dimension image display device is realized.

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EFFECT OF THE INVENTION

There was a problem that the "surroundings lump stereoscopic vision effectiveness" was not acquired.
[0014] By switching the image display to a display, and the display of the opening pattern to a space light modulation element synchronously for every pixel which corresponds, respectively, and every corresponding scanning line using the parallax barrier method, the purpose of this invention has few cross talks of a parallax image on either side, and is offer of the solid image display device using the outstanding solid image display approach and outstanding it which a flicker and a Moire fringe moreover cannot produce easily.
[0015] In addition to this (1-1) The 1st A stripe image and the 2nd A stripe image and the 1st A parallax barrier pattern and the 2nd By switching the change of a parallax barrier pattern synchronously for every pixel which corresponds, respectively, and every corresponding scanning line, and displaying it at high speed, there are very few cross talks and they can recognize each of a parallax image to high resolution without lack on the whole screen surface of a display.
(1-2) With conventional equipment, since four polarizing plates are used, to there having been a problem that brightness fell by absorption of this polarizing plate, one polarizing plate can be reduced and display brightness can be raised.
(1-3) even if an observer move by control the width of face of the stripe pixel display on a display , the width of face of the light transmission section and the optical protection from light section form in a space light modulation element , spacing of a display and a space light modulation element , or the relative location of a stripe pixel and the light transmission section , with the signal from the observation condition input means which the observation condition detection means or the observer who detect an observer view location automatically input , stereoscopic vision can always carry out good .
(1-4) With the signal from the observation condition input means which the observation condition detection means or observer who detects an observer's view location automatically inputs Use it from three or more original parallax images which constitute the parallax image information which the parallax image source has, choosing two parallax images. Or by generating two parallax images from the data which constitute this parallax image information, or interpolating or reconfigurating and creating two parallax images from at least two original parallax images which constitute this parallax image information the parallax image with which view locations differ according to it when an observer moves -- suitable -- constituting -- being the so-called -- smooth

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] the conventional example currently indicated by JP,3-119889,A -- image display side 101 **** -- at least 2 the parallax image of ** -- respectively -- a stripe pixel -- dividing -- these [2] the stripe pixel from the parallax image of ** -- alternation -- arranging -- 1 The stripe image of ** was compounded and this was displayed. Therefore, the resolution of an image display device is 1/2 at least to the original parallax image. There was a falling problem.
[0008] Furthermore, at the above-mentioned conventional example, it is the image display side 101. The stripe image and the electronic formula parallax barrier 103 which consist of the stripe pixel of the displayed length Since a synchronization was taken and the parallax barrier pattern to form was not displayed, the cross talk of a right-and-left image occurred, and a flicker may be produced, and it was offensive to the eye.
[0009] Moreover, when there was no view migration of an observer, since the display position of a barrier stripe did not change, it had the problem of producing the fall of the brightness localized in the shape of a stripe.
[0010] Furthermore, since an image display side has [an image display means] stripe-like pixel structure in the case of liquid crystal etc. and this image was observed through the barrier stripe of the shape of same stripe, there was a problem of being easy to produce a Moire fringe.
[0011] Furthermore, at the conventional example indicated by JP,5-122733,A, it is 4 with the whole equipment. Since the polarizing plate of ** was used, there was a problem that brightness fell by this absorption.
[0012] In addition, in these conventional examples, although reverse stereoscopic vision was prevented by replacing the display position of the right eye image of a stripe image, and a left eye image when an observer moved only both-eyes spacing (base length) to a longitudinal direction, there was a problem that it could not respond in change of the view location of order.
[0013] Furthermore, in the conventional example, only by making it follow so that a right parallax image may always carry out incidence to an eye according to view location change of an observer, in order to prevent reverse stereoscopic vision, the solid image currently observed is always the same, and can acquire a smooth cubic effect.

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MEANS

[Means for Solving the Problem] The solid image display approach of this invention (2-1) Each of two or more parallax images from the parallax image source which has parallax image information is divided into a stripe pixel. Arrange these a part of two or more stripe pixels in predetermined sequence, compound one stripe image, and it displays on a display. The opening pattern which consists of the predetermined light transmission section and the optical predetermined protection-from-light section of a pitch on the space light modulation element prepared in the position of the front of this display or back is displayed. When acquiring stereoscopic vision by carrying out incidence of the stripe pixel corresponding to the eye of each right and left of this stripe image to the eye of right and left of an observer by this space light modulation element, respectively, It is characterized by synchronizing for every pixel and every scanning line on the scanning line which corresponds and scans this display and this space light modulation element, and displaying this stripe image and this opening pattern etc.
[0017] Especially (2-1-1) The scanning line which corresponds and scans said display and said space light modulation element performs interlace scanning.
(2-1-2) Scan the scanning line which corresponds and scans said display and said space light modulation element in the direction of a vertical.
(2-1-3) Said two or more parallax images are parallax images on either side. The 1st stripe image which said stripe image arranged by turns the odd-numbered stripe pixel of the stripe pixels into which the parallax image of this right was divided, and the even-numbered stripe pixel of the stripe pixels into which the parallax image of this left was divided, and was compounded, Or it is the 2nd stripe image which arranged by turns the even-numbered stripe pixel of these stripe pixels into which the parallax image of this right was divided, and the odd-numbered stripe pixel of these stripe pixels into which the parallax image of this left was divided, and compounded them. this -- after displaying one of the two stripe images on this display, the stripe image of another side is displayed continuously and the opening pattern which switched the light transmission section and the optical protection-from-light section on said space light modulation element is displayed in that case.
(2-1-4) Said stripe image is displayed on a part of screen of said display, displays a non-stripe image on the part of the remainder of this screen, displays an opening pattern on the part corresponding to this stripe image displayed on this display among the screen of said space light modulation element, and changes the part of the remainder in the screen of this space light modulation element into a light transmission condition.
(2-1-5) Display said stripe image on a part of screen of said display, it displays a non-stripe image on the part of the remainder of this screen, and displays an opening pattern on the screen of said space light modulation element on the whole surface.
(2-1-6) The display width of face of the light transmission section of said opening pattern displayed on the display width of face and/or said space light modulation element of each stripe pixel which constitutes said stripe image displayed on said display, and the optical protection-from-light section is two or more width of face of the pixel which constitutes each screen.
(2-1-7) The display width of face of each stripe pixel which constitutes said stripe image displayed on said display is 1 pixel in width of face of the pixel which constitutes the screen of this display, and the display width of face of the light transmission section and the optical protection-from-light section of said opening pattern displayed on said space light modulation element is two or more width of face of the pixel which constitutes the screen of this space light modulation element.
(2-1-8) The display width of face of each stripe pixel which constitutes said stripe image displayed on said display is two or more width of face of the pixel which constitutes the screen of this display, and the display width of face of the light transmission section of said opening pattern displayed on said space light modulation

element and the optical protection-from-light section is 1 pixel in width of face of the pixel which constitutes the screen of this space light modulation element.
(2-1-9) Each screen of said display and said space light modulation element has the pixel of matrix structure.
(2-1-10) From the stripe image displayed on said display, the light which consists of a predetermined polarization light is injected.
(2-1-11) Said space light modulation element consists of liquid crystal devices.
(2-1-12) Control at least one of the component of said stripe image, and the components of said opening pattern by the signal from the observation condition input means which the observation condition detection means or observer who detects an observer's view location automatically inputs.
(2-1-13) Control spacing of said display and said space light modulation element by the spacing control means based on the signal from the observation condition input means which the observation condition detection means or observer who detects an observer's view location automatically inputs.
(2-1-14) Use it from three or more original parallax images which constitute said parallax image information with the signal from the observation condition input means which the observation condition detection means or observer who detects an observer's view location automatically inputs, choosing said parallax image.
(2-1-15) The signal from the observation condition input means which the observation condition detection means or the observer who detects an observer's view location automatically inputs generates said parallax image according to an observer's view location from the data which constitute said parallax image information, or respond to an observer's view location, interpolate or reconfigurate this parallax image and create it from at least two original parallax images which constitute this parallax image information.
(2-1-16) Precede two or more scanning lines preceded with two or more pixels preceded with the pixel displayed on this space light modulation element synchronizing with the time of synchronizing said display and said space light modulation element for every pixel and every scanning line, and displaying said stripe image and said opening pattern, or the scanning line synchronized and displayed as the protection-from-light section, and display them.
(2-1-17) The screen of said display and said space light modulation element is divided into two or more fields of the respectively same magnitude along with the scanning line, and from these two or more fields, the scanning line of the same location is chosen as coincidence, scan it relatively, synchronize for every scanning line with which every pixel and these two or more scanning lines correspond on these two or more scanning lines on this display and this space light modulation element, and display said stripe image and said opening pattern.
[0018] Moreover, solid image display device of this invention (2-2) Each of two or more parallax images from the parallax image source which has parallax image information is divided into a stripe pixel. One stripe image which arranged these a part of two or more stripe pixels in predetermined sequence, and compounded it is displayed on a display. The opening pattern which consists of the predetermined light transmission section and the optical predetermined protection-from-light section of a pitch on the space light modulation element prepared in the position of the front of this display or back is displayed. When acquiring stereoscopic vision by carrying out incidence of the stripe pixel corresponding to the eye of each right and left of this stripe image to the eye of right and left of an observer by this space light modulation element, respectively, It is characterized by synchronizing for every pixel and every scanning line on the scanning line which corresponds and scans this display and this space light modulation element, and displaying this stripe image and this opening pattern etc.
[0019] Especially (2-2-1) The scanning line which corresponds and scans said display and said space light modulation element is performing interlace scanning.
(2-2-2) The scanning line which corresponds and scans said display and said space light modulation element is scanned in the direction of a vertical.
(2-2-3) Said two or more parallax images are parallax images on either side. The 1st stripe image which said stripe image arranged by turns the odd-numbered stripe pixel of the stripe pixels into which the parallax image of this right was divided, and the even-numbered stripe pixel of the stripe pixels into which the parallax image of this left was divided, and was compounded, Or the even-numbered stripe pixel of these stripe pixels into which the parallax image of this right was divided, It is the 2nd stripe image which arranged by turns the odd-numbered stripe pixel of these stripe pixels into which the parallax image of this left was divided, and compounded it. this -- the opening pattern displayed on the occasion of the display of the 1st stripe image -- this -- the opening pattern displayed on the occasion of the display of the 2nd stripe image -- mutual -- relation with

reverse light transmission section and optical protection-from-light section -- it is -- this -- two stripe images are displayed continuously.
(2-2-4) Said stripe image is displayed on a part of screen of said display, displays a non-stripe image on the part of the remainder of this screen, displays an opening pattern on the part corresponding to this stripe image displayed on this display among the screen of said space light modulation element, and changes the part of the remainder in the screen of this space light modulation element into a light transmission condition.
(2-2-5) Display said stripe image on a part of screen of said display, it displays a non-stripe image on the part of the remainder of this screen, and displays an opening pattern on the screen of said space light modulation element on the whole surface.
(2-2-6) The display width of face of the light transmission section of said opening pattern displayed on the display width of face and/or said space light modulation element of each stripe pixel which constitutes said stripe image displayed on said display, and the optical protection-from-light section is two or more width of face of the pixel which constitutes each screen.
(2-2-7) The display width of face of each stripe pixel which constitutes said stripe image displayed on said display is 1 pixel in width of face of the pixel which constitutes the screen of this display, and the display width of face of the light transmission section of said opening pattern displayed on said space light modulation element and the optical protection-from-light section is two or more width of face of the pixel which constitutes the screen of this space light modulation element.
(2-2-8) The display width of face of each stripe pixel which constitutes said stripe image displayed on said display is two or more width of face of the pixel which constitutes the screen of this display, and the display width of face of the light transmission section and the optical protection-from-light section of said opening pattern displayed on said space light modulation element is 1 pixel in width of face of the pixel which constitutes the screen of this space light modulation element.
(2-2-9) Each screen of said display and said space light modulation element has the pixel of matrix structure.
(2-2-10) Said space light modulation element is a liquid crystal device.
(2-2-11) Said space light modulation element is a ferroelectric liquid crystal component.
(2-2-12) Said display is a liquid crystal device.
(2-2-13) Said display is a ferroelectric liquid crystal component.
(2-2-14) Said display consists of spontaneous light type television and one polarizing plate.
(2-2-15) Inject the light which consists of a predetermined polarization light, and a liquid crystal device and one polarizing plate constitute said space light modulation element from the stripe image displayed on said display.
(2-2-16) Control at least one of the component of said stripe image, and the components of said opening pattern by the signal from the observation condition input means which the observation condition detection means or observer who detects an observer's view location automatically inputs.
(2-2-17) Control spacing of said display and said space light modulation element by the spacing control means based on the signal from the observation condition input means which the observation condition detection means or observer who detects an observer's view location automatically inputs.
(2-2-18) Use it from three or more original parallax images which constitute said parallax image information with the signal from the observation condition input means which the observation condition detection means or observer who detects an observer's view location automatically inputs, choosing said parallax image.
(2-2-19) The signal from the observation condition input means which the observation condition detection means or the observer who detects an observer's view location automatically inputs generates said parallax image according to an observer's view location from the data which constitute said parallax image information, or respond to an observer's view location, interpolate or reconfigurate this parallax image and create it from at least two original parallax images which constitute this parallax image information.
(2-2-20) Precede two or more scanning lines preceded with two or more pixels preceded with the pixel displayed on this space light modulation element synchronizing with the time of synchronizing said display and said space light modulation element for every pixel and every scanning line, and displaying said stripe image and said opening pattern, or the scanning line synchronized and displayed as the protection-from-light section, and display them.
(2-2-21) The screen of said display and said space light modulation element is divided into two or more fields of the respectively same magnitude along with the scanning line, and from these two or more fields, the scanning line of the same location is chosen as coincidence, scan it relatively, synchronize for every scanning

line with which every pixel and these two or more scanning lines correspond on these two or more scanning lines on this display and this space light modulation element, and display said stripe image and said opening pattern. It is characterized by things etc.
[0020] Furthermore, solid image display device of this invention (2-3) The parallax image for the right-and-left eyes from the parallax image source is respectively divided into a stripe pixel. The display which carries out sequential formation while scanning one stripe image which arranged this stripe pixel in predetermined sequence, and compounded it, The space light modulation element which the opening pattern which consists the front or behind this display of the predetermined light transmission section and the optical predetermined protection-from-light section of a pitch is synchronized with this scan, and carries out sequential formation is arranged. It is characterized by carrying out stereoscopic vision etc. by carrying out incidence of the stripe pixel corresponding to the eye of each right and left of this stripe image for the light from this stripe image displayed on this display to the eye of right and left of an observer with this opening pattern, respectively.
[0021] Especially (2-3-1) Said space light modulation element is prepared ahead of said display, and it has the linear Fresnel lens which has chisel power horizontally between the front of this space light modulation element, or this display and this space light modulation element.
(2-3-2) The space light modulation element illuminated with the light source means is prepared behind said display, and it has the linear Fresnel lens which has chisel power horizontally between the front of this display, or this display and this space light modulation element. It is characterized by things etc.
[0022] Moreover, the solid image display approach of this invention (2-4) The parallax image for the right-and-left eyes from the parallax image source is respectively divided into a stripe pixel. Sequential formation is carried out scanning on a display one stripe image which arranged this stripe pixel in predetermined sequence, and compounded it. The light from this stripe image displayed on this display with the opening pattern which the predetermined light transmission section and the optical predetermined protection-from-light section of a pitch were synchronized with this scan, and carried out sequential formation on the space light modulation element It is characterized by carrying out stereoscopic vision etc. by carrying out incidence of the stripe pixel corresponding to the eye of each right and left of this stripe image to the eye of right and left of an observer, respectively.
[0023]
[Embodiment of the Invention] Drawing 1 Operation gestalt 1 of the solid image display device of ******** It is an important section schematic diagram. Moreover, drawing 2 is the operation gestalt 1. The explanatory view of the solid image display approach, drawing 3 Operation gestalt 1 The explanatory view of the drive approach, drawing 4 Operation gestalt 1 It is the explanatory view of a display condition. In addition, an image display part is a level sectional view among drawing. the inside of drawing, and 1 Liquid crystal device (LCD) which is a display, for example, has the back light light source etc. -- it is -- the screen consists of many pixels of matrix structure, and displays an image by the scanning-line scan of a no interlace. 11 (11A) Display 1 It is the ** type Fig. which expressed typically the condition of the below-mentioned stripe image displayed on an image display side.
[0024] 2 It is a ****** light modulation element, constitute from a transparency mold liquid crystal device etc., the screen consists of many pixels of matrix structure, and it is a display 1. In case a solid image is displayed, the predetermined light transmission section (opening) and the optical predetermined protection-from-light section of a pitch are arranged horizontally, and parallax barrier pattern (opening pattern) 2A or 2B is formed (it displays). AR and AL They are an observer's right eye and a left eye, respectively.
[0025] In addition, it sets on these specifications and is a display 1. Or space light modulation element 2 The "front", and a call and its opposite side are called "back" for an observer side. Therefore, at this operation gestalt, it is a display 1. It is the space light modulation element 2 to the front. It arranges.
[0026] 15 is 3 of the multi-channel image pick-up equipment which is the parallax image source, for example, has VTR or the multi-channel camera of many channels, or a photographic subject. It consists of dimension data etc. It is two or more images from these, and 3 below. Suppose that dimension data are called parallax image information. In addition, although it has two or more images with VTR of many channels, and multi-channel image pick-up equipment, since a parallax image (image with parallax) is chosen from these images, suppose that two or more of these images are called a original parallax image.
[0027] 9 It is a ****** condition input means and is observation positional information and display 1 of an observer. Information, such as a viewing area of the solid image to display, is inputted. 3 The parallax image RS

for right eyes and the parallax image LS for left eyes are taken out from the parallax image information which is a ********** means and the parallax image source 15 has, and these parallax images RS and LS are divided horizontally, generate the stripe pixel of the shape of a longwise stripe, arrange them in by turns, and it is 1. It compounds in the stripe image of **. Hereafter, the stripe pixel based on the parallax image RS is displayed as Ri (i= 1, 2, 3, 4 ...), and the stripe pixel based on the parallax image LS is expressed as Li (i= 1, 2, 3, 4 ...).
[0028] 4 It is a ** display drive circuit and is the image-processing means 3. It is a display 1 about the stripe image compounded and outputted. It displays on the screen. 5 a ** barrier drive circuit -- it is -- image-processing means 3 from -- a signal -- space light modulation element 2 It drives and a parallax barrier pattern is formed on it.
[0029] The relation between the stripe image 11 of this operation gestalt and a parallax barrier pattern is explained. drawing 1 it is alike and is shown -- as -- an observer's both-eyes spacing (base length) -- display image 11 (11A) on O and an image display side (stripe image) from -- the observation distance to an observer's eye -- C -- Display 1 Space light modulation element 2 (parallax barrier) Spacing D, space light modulation element 2 the width of face of opening of the formed parallax barrier pattern -- B' and display 1 pixel spacing (width of face) of the stripe pixel which constitutes the stripe image to display -- P ** -- if it carries out, in order to acquire stereoscopic vision, it is necessary to satisfy the following relation among these
[0030]
D =P-C /(O+P) ---------- (1) B'=P- (C-D) / C ---------- (2) -- since observation width of face has the breadth of finite in an observation location still in fact, these amounts of many are changed a little, and are set up. S.H.Kaplan has stated these relation to the detail in said reference.
[0031] It sets in this operation gestalt and is a display 1. It carries out and is pixel size. The liquid crystal display of 0.110mm(horizontal) x 0.330mm (length) is used, and it is the 1. Since the pixel was made into the width of face of the stripe pixel of each parallax image Pixel spacing serves as P = 0.110 mm. On the other hand, since the base length is set up with O= 65mm and observation distance is set up with C= 1000 mm as observation conditions, it is the space light modulation element 2. Configuration item D= 1.69mm and B'=0.1098mm It becomes. In addition, in consideration of observation broadening, some are tuned finely.
[0032] Drawing 1, and 2, 3 and 4 The solid image display approach of this invention is explained.
[0033] That is, it sets at a certain time of day (at the time of the display condition of drawing 2 (A)), and is the image-processing means 3. It is 2 from the parallax image source 15. The parallax images RS and LS of ** are taken out. them -- longwise stripe pixels Ri and Li dividing -- these stripe pixels -- for example, R1L2R3L4R5 L6 from the left end of a plot side .... and alternation -- arranging -- the 1st Stripe image 11A ****** -- it compounds. This 1st [the] Stripe image 11A Data are the display drive circuit 4. It is inputted and is the display drive circuit 4. Display 1 It is the 1st to an image display side. Stripe image 11A It displays.
[0034] coincidence -- image processing means 3 the output of the data of the above-mentioned stripe image -- synchronize -- barrier drive circuit 5 the image data of a parallax barrier pattern -- input -- barrier drive circuit 5 space light modulation element 2 upper point G opening and closing opening and closing opening and closing -- the 1st which formed the light transmission section and the optical protection from light section of width of face B' by turns in the sequence ... parallax barrier pattern 2A display.
[0035] The formation field of this parallax barrier pattern is said display 1. The image field (the case of the whole surface is shown in drawing 1) to which the stripe image 11 is displayed is supported.
[0036] this time -- a right eye AR -- the 1st Only the parallax image for right eyes which consisted of .... carries out incidence. parallax barrier pattern 2A -- minding -- stripe pixel R1R3R5 -- a left eye AL -- the 1st parallax barrier pattern 2A -- minding -- the stripe pixel L -- the parallax image for left eyes which consisted of .... 2L4 L6 -- incidence -- carrying out -- the principle as the conventional parallax barrier method with the same observer -- the 1st Stripe image 11A Stereoscopic vision can be carried out.
[0037] 1 In Time of Day Which Finishes Carrying Out Frame Scanning and is Scanning the Again Same Scanning Line as above (at the Time of Display Condition of Drawing 2 (B)) Display 1 With the above-mentioned sequence, as a stripe image 11 to display, reverse, That is, it is a stripe pixel L1R2L3R4L5R6 ... The 2nd put in order Stripe image 11B It displays. space light modulation element 2 **** -- point G the open-close-open opening-and-closing close contrary to the above-mentioned sequence -- the 2nd which formed the light transmission section and the optical protection-from-light section by turns in the sequence ... Parallax barrier pattern 2B is displayed.
[0038] this time -- a right eye AR -- the 2nd Only the parallax image for right eyes which consisted of .... carries

out incidence. parallax barrier pattern 2B -- minding -- stripe pixel R2R4R6 -- a left eye AL -- parallax barrier pattern 2B -- minding -- stripe pixel L1L3L5 -- the parallax image for left eyes which consisted of .... incidence -- carrying out -- the principle as the conventional parallax barrier method with the same observer -- the 2nd Stripe image 11B Stereoscopic vision can be carried out.

[0039] And it is this 2 by turns. It is a display 1 so that it may be in the display condition of **. Space light modulation element 2 Synchronize for every pixel and by scanning and displaying a stripe image and a parallax barrier pattern a right eye -- stripe pixel R1R2R3R4 -- all the parallax images RS that consisted of .... a left eye -- stripe pixel L1L2L3L4 -- all the parallax images LS that consisted of .... are observed without a flicker, respectively.

[0040] Drawing 3 and 4 It is the operation gestalt 1 to a detail further. An operation is explained.

[0041] As mentioned above, the 1st scanning line Stripe image 11A The 1st () It is drawing 3 in case parallax barrier pattern 2A is displayed. It is a display 1 so that it may be shown. Space light modulation element 2 [Y1 Y2, Y3,] [Y4] ..... image-processing means 3 from -- a synchronizing signal -- minding -- respectively -- Y a driver 6 and 6' -- driving -- coincidence -- X A driver 7 and 8 from -- a display driving signal and a barrier driving signal are inputted synchronously, respectively. That is, display 1 The 1st scanning line Y1 and space light modulation element 2 The scanning line Y1 is driven to coincidence, and it is a display 1. The 1st Pixel Xi and the space light modulation element 2 on the scanning line Y1 The 1st The pixel Xi on the scanning line Y1 (scanning line corresponded and scanned) is driven synchronously, and an image is displayed on the pixel.

[0042] first, display 1 the whole screen surface -- the 2nd Stripe image 11B it displays -- having -- space light modulation element 2 **** -- the 2nd Suppose that parallax barrier pattern 2B was displayed. Drawing 4 (A) It is the above condition to the display 1 so that it may be shown. The 1st To the pixel on the scanning line Y1 RLRLRL compounded from the stripe pixel of a parallax image on either side -- the 1st located in a line with .... (right -- R -- it outlines like the left although it is ... 1L2R3L4R5 L6) Stripe image 11A While indicating the applicable part by sequential space light modulation element 2 The 1st the pixel on the scanning line Y1 -- drawing 4 (B) it is shown -- as -- opening-and-closing opening-and-closing opening and closing -- the 1st with which the ... and light protection-from-light section and the light transmission section were located in a line by turns parallax barrier pattern 2A -- sequential display 1 It displays synchronously for every pixel.

[0043] And it is the 2nd next. The scanning line Y2 is chosen and it is a display 1. Space light modulation element 2 The 2nd It is the 1st like [the pixel on the scanning line Y2] a front. Stripe image 11A An applicable part and the applicable part of 1st parallax barrier pattern 2A are synchronously displayed for every pixel.

[0044] Drawing 4 It is the 5th as the scans of all finish then. The scanning line Y5 is chosen and it is a display 1. The 7th The pixel data of the stripe pixel R7 are displayed on a pixel X7 (drawing 4 (A)), and it synchronizes with this, and is the space light modulation element 2. The 7th The situation of the moment (drawing 4 (B)) of forming the optical protection-from-light section in a pixel X7 is shown typically. Therefore, display 1 In the upper part, it is the 1st. Stripe image 11A It is displayed and is the 2nd in the lower part. Stripe image 11B It is displayed. Moreover, space light modulation element 2 In the upper part, it is the 1st. Parallax barrier pattern 2A is displayed and it is the 2nd in the lower part. Parallax barrier pattern 2B is displayed.

[0045] If this is repeated successively and the scan of the last scanning line finishes, it will be the 1st to the whole display screen. Stripe image 11A It is displayed and is this The 1st Space light modulation element 2 which forms parallax barrier pattern 2A It is the 1st by minding and observing. Stripe image 11A It is observable as a solid image.

[0046] Subsequently, the 1st It scans sequentially from the scanning line and is a display 1 in that case. With the above-mentioned sequence, as a stripe image 11 to display, reverse, that is, a stripe pixel -- LRLRLR -- the 2nd located in a line with .... (right -- L -- one R2L3R4L5R6 -- it outlines like the left although it is ...) Stripe image 11B An applicable part is displayed. space light modulation element 2 The 2nd In the sequence ..., form the light transmission section and the optical protection-from-light section by turns, and they are displayed. the open-close-open opening-and-closing close contrary to the above-mentioned sequence as a parallax barrier pattern 2B -- This space light modulation element 2 It minds and is a display 1. It is the 2nd by observing. Stripe image 11B It is observable as a solid image.

[0047] Therefore, at this operation gestalt, it is stripe image 11A. 11B Since stereoscopic vision is carried out by turns, they are each eyes AR and AL of an observer. A high-definition solid image can be observed without displaying each parallax image RS and LS without lack, and spoiling the resolution of a parallax image. For this, the display resolution which resolution uses in the solid image display device which used the conventional

parallax barrier method is one half at least. Considering falling, it is 2. It is a twice as many highly minute image as this.
[0048] and at this operation gestalt , it be a display 1 . space light modulation element 2 one on the scanning line by take and drive a synchronization for every pixel , a stripe pixel and opening of the parallax barrier pattern corresponding to it be maintain the relation which always synchronize , change and can observe a solid image correctly in any time amount during the display of a stripe image . Therefore, with this operation gestalt, the cross talk of a parallax image on either side is reduced remarkably.
[0049] Furthermore, at this operation gestalt, it is the space light modulation element 2. Since the light transmission section and the optical protection-from-light section of a parallax barrier pattern which are formed upwards interchange by turns, it has the effectiveness that the contrast of a moire pattern falls and that the repeat structure of the light transmission section and the optical protection-from-light section of a parallax barrier pattern is not conspicuous.
[0050] Furthermore, display 1 used for this operation gestalt And space light modulation element 2 Although it is ideal to use what has a high-speed frame rate Since a stripe image and a parallax barrier pattern are synchronized with this operation gestalt and it is displaying Since each parallax image is always carrying out incidence and an observer does not sense a flicker, without producing a cross talk in the eye of each right and left, it is 60Hz - 120Hz. The thing of a frame rate can also be used.
[0051] in addition, space light modulation element 2 the thing in which high contrast and a high-speed drive are possible in order for the parallax barrier pattern formed on it to perform separation with the parallax image of a right eye, and the parallax image of a left eye -- required -- these points to ferroelectric liquid crystal component (FLC) display 1 of this operation gestalt space light modulation element 2 ****** -- it is suitable to use.
[0052] moreover, display 1 Space light modulation element 2 ****** -- since it is easy to secure a synchronization since the display speed (speed of response) is the same if it uses the liquid crystal device of the same class in using a liquid crystal device, and the same drive circuit can be used, it is convenient.
[0053] in addition -- this operation gestalt -- image-processing means 3 from -- although driven with the synchronizing signal -- as the drive approach -- display drive circuit 4 a synchronizing signal is generated -- making -- taking the drive timing of the barrier drive circuit 5 **** -- Y The various drive approaches, such as taking a synchronization with a driver, can be used.
[0054] Moreover, it is good even if it considers as a display 1 with this operation gestalt. 1 It is the spacing P of a stripe image about a pixel. Case [it is equal] R1 and L2 (i.e., stripe pixels) .... It is a display 1, respectively. 1 Although the case of being equivalent to a pixel was shown, they are the stripe pixels Ri and Li. Pixel width of face is RGB at the time of it being good also as two or more pixel width of face of a display 1, for example, performing color display. It is spacing P about pixel width of face.
[0055] Moreover, it is 2 here. Although the case where the parallax image of ** was displayed was explained, two or more parallax images are compounded, a stripe image is created, and this is observed through a suitable parallax barrier. The same approach can be used also in a "parallax panorama gram."
[0056] Moreover, space light modulation element 2 of this invention Since opening of a long rectangle is formed in the direction of a vertical, with matrix-like pixel structure, you may not be and vertical Rhine-like pixel structure is sufficient.
[0057] In addition, the width of face P of a stripe pixel, a number, etc. are the components of a stripe image, and width-of-face B' of the opening and the protection-from-light section of a parallax barrier pattern etc. is the component of an opening pattern (parallax barrier pattern).
[0058] this operation gestalt -- observation condition input means 9 from -- a signal -- above -- at least 1 of the component of a stripe image, and the component of an opening pattern ** is controlled.
[0059] Drawing 5 Operation gestalt 2 of the solid image display device of ******** It is an important section schematic diagram. This operation gestalt is the operation gestalt 1. It sets in a configuration and is a display 1. And space light modulation element 2 It especially carries out and is an operation gestalt using TN liquid crystal device (TN liquid crystal cell). Other parts are the same as the operation gestalt 1.
[0060] 1 It is the display which displays the ** stripe image 11, and is 2. It constitutes so that the TN liquid crystal cell 23 (a glass substrate, an electrode, etc. are un-illustrating) pinched with the polarizing plates 22 and 24 of ** may be illuminated with the back light 21 which has a reflecting plate and a light guide plate. Therefore, display 1 The light of the linearly polarized light injects from the image to display. 2 It is a ****** light modulation element and is a display 1. It is the TN liquid crystal cell 25 to an observer side in a side 1 The

polarizing plate 26 of ** is prepared and constituted and a stripe-like parallax barrier pattern is displayed.
[0061] It is the operation gestalt 1 also at this operation gestalt. It is a display 1 similarly. Upper stripe images 11A and 11B Space light modulation element 2 Upper parallax barrier pattern 2A and 2B Since it changes and displays synchronously, the resolution of a parallax image does not fall, either, but the solid image of good image quality can be observed.
[0062] Drawing 6 It is an explanatory view about the relation of the polarization shaft orientation of a polarizing plate and the observation image in a **** operation gestalt. For example, display 1 of this operation gestalt It carries out and the case where the polarization shaft of a polarizing plate 22 is suitable in the direction perpendicular to space so that the liquid crystal display in the Nor Marie White mode may be used and illustrated is considered. At this time, it is changing into the condition of a cross Nicol's prism, and 90 degrees of polarization shafts rotate and, as for polarizing plates 22 and 24, only the light which carried out incidence to the part (OFF part) in which the electrical potential difference is not impressed to the TN liquid crystal cell 23 among the light from a back light 21 penetrates a polarizing plate 24.
[0063] On the other hand, it is the space light modulation element 2. They are the TN liquid crystal cells 25 and 1 too. It consists of polarizing plates 26 of **, and an electrical potential difference is impressed only for opening (ON part) of a parallax barrier pattern. therefore, display 1 from -- the penetrated display-image light (the polarization shaft is parallel to space) does not receive a modulation in plane of polarization in opening (ON part) of this parallax barrier pattern, but penetrates a polarizing plate 26 (the polarization shaft is parallel to space) as it is. A left eye image (L image) is penetrated in the direction of a left eye AL. And a right eye image (R image) is penetrated in the direction of a right eye AR, and a solid image is observed. The above is explanation of the relation between the polarization shaft orientation of a polarizing plate, and an observation image.
[0064] With the conventional equipment currently indicated by JP,3-119889,A, it is 4. Since the polarizing plate of ** was used, there was a problem that the brightness of a display image fell by absorption of this polarizing plate. On the other hand, at this operation gestalt, it is a polarizing plate 1 Since it is ******(ing), the brightness of a display image is raised.
[0065] Space light modulation element 2 The polarization shaft orientation of the polarizing plate to constitute can be set up besides the above. For example, drawing 7 The polarization shaft of polarizing plate 26' may be perpendicular to space so that it may be shown, and it is the space light modulation element 2 then. An electrical potential difference is not impressed to opening of the parallax barrier pattern to display. in this case, display 1 from -- the penetrated image display light (the polarization shaft is parallel to space) rotates 90 degrees of plane of polarization by this opening (OFF part), and it penetrates polarizing plate 26' to which the polarization shaft was set at right angles to space, and it carries out incidence to each eye. That is, the polarization direction of the image light which carries out incidence to each eye in this case is drawing 6. It lies at right angles to a case.
[0066] The same thing is a display 1. 3 used for the solid image display device of this invention according to each condition although generated also with the display mode of the liquid crystal panel to be used What is necessary is just to set up the polarization shaft of the polarizing plate of **.
[0067] In addition, drawing 8 It is a display 1 so that it may be shown. CRT A spontaneous light type display and 1 It can also constitute from a polarizing plate of **. [like]
[0068] Drawing 9 Operation gestalt 3 of the solid image display device of ******** It is an important section schematic diagram. This operation gestalt is equipment which makes good stereoscopic vision possible over the large range by detecting an observer's view location automatically and controlling actuation of a solid image display device according to it.
[0069] Among drawing, 36 are an observer image input means and input the image of the observer who observes this equipment. The observer image input means 36 of this operation gestalt is 1. It constitutes from a camera of a base. 37 is a camera controller and controls the observer image input means 36. 38 is a view location / direction detector of a look, and detects the view location and the direction of a look of an observer by the image processing from the signal from the observer image input means 36. The observer image input means 36, the camera controller 37, and the view location / direction detector of look 38 grade constitute an element of the observation condition detection means 30.
[0070] An operation of this operation gestalt is explained. An observer's image photoed with the observer image input means 36 is inputted into a view location / direction detector 38 of a look through the camera controller 37. In a view location / direction detector 38 of a look, an image processing extracts the image of an observer's

eye from the inputted image, and the view location and the direction of a look of an observer are detected.
[0071] Operation gestalt 1 To the described appearance, the display action of the solid image display device of this invention is the conditional expression (1) of a parallax barrier, and (2). Since it carries out by being based If an observer moves forward and backward, it will respond to an observer's location (observation distance), and it is a display 1. Pixel spacing P of the stripe pixel to display (width of face) While changing, it is the space light modulation element 2. It is desirable to change width-of-face B' of opening of the parallax barrier pattern to form.
[0072] Here, it is a display 1. Pixel size 0.110mm (width) A x0.330mm (length) liquid crystal display is used, and it is the 3. Since the pixel was made into the stripe width of face (width of face of a stripe pixel) of each parallax image, pixel spacing is P=0.110 x3= 0.330 mm. It becomes.
[0073] And it is the 1st first. As observation conditions, the base length is set up with O= 65mm, and observation distance is set up with C= 1000mm. It is the space light modulation element 2 by this. Conditions D= 5.05mm and B'=0.3283mm It is set up. In addition, it is desirable to tune some finely in consideration of observation broadening. Supposing an observer moves to a location with an observation distance of about 1500mm from this location The observation distance in an observation condition changes with C= 1500mm, and it is spacing D in this case. It is a display 1 supposing it does not change. Width of face P of the upper stripe pixel P= 0.220mm, Space light modulation element 2 It is B'=0.2192mm about width-of-face B' of opening of the upper parallax barrier pattern. If it carries out, it will be conditional expression (1) and (2). It is satisfied. Then, it is the width of face P of the stripe pixel of a stripe image in this case. Display 1 2 It displays by the pixel and is the space light modulation element 2 about width-of-face B' of opening of a parallax barrier pattern. 2 What is necessary is just to form by the pixel.
[0074] thus , with this operation gestalt , an observation condition detection means 30 detect an observer view location , and it be the occasional observation distance C after this . the width of face P of the stripe pixel which compute and constitute a stripe image according to this and a space light modulation element 2 carry out stereoscopic vision good over the observation location of a large range by control suitably width of face B ' (and the width of face of the protection from light section) of opening of the parallax barrier pattern display .
[0075] In addition, as an observation condition detection means 30 of this operation gestalt, it is 2. Use the camera of a base, or form the magnetic field in an observer's perimeter, and an observer's head is made to equip with a magnetic sensor, the output from this sensor can be used or look detection means, such as a well-known eye mark camera, can also be used.
[0076] moreover , even if it set in this operation gestalt , it be the observation condition input means 9 . while an observer input a view location himself or observe a display image , an observer control an adjustment switch etc. , and it be a display 1 . at least 1 of the component of the stripe image which show the solid image in the top , and the component of an opening pattern ** be also controllable .
[0077] Drawing 10 is the operation gestalt 4 of the solid image display device of this invention. It is an important section schematic diagram. this operation gestalt -- operation gestalt 3 a different point -- observation distance C the case where it changes -- operation gestalt 3 **** -- width of face P of a stripe pixel having changed width-of-face B' of opening of a parallax barrier pattern, and having made the solid image observe -- receiving -- this operation gestalt -- display 1 Space light modulation element 2 Spacing D It is the point of changing and making a solid image observing. About others, it is the same.
[0078] the inside of drawing, and 33 -- display 1 Space light modulation element 2 Spacing D It is the adjustable SU **-sir to control and the die length changes with signals. 34 -- a spacer driving means -- it is -- image-processing means 3 from -- the adjustable spacer 33 is controlled by the signal. The adjustable spacer 33 and the spacer driving means 34 grade constitute an element of a spacing control means.
[0079] An operation of this operation gestalt is explained. With this operation gestalt, the observation condition detection means 30 detects an observer's view location, and it is the occasional observation distance C after this. It computes, the adjustable spacer 33 is controlled through the spacer driving means 34 according to this, and it is a display 1. Space light modulation element 2 Spacing D It changes and a solid image is made to observe.
[0080] The principle is explained below. now, a formula (1), and (2) :C =D-(O+P)/P**k-D rewritten as follows ---------- (3) -- B'=P-(k-1)/k ---------- (4) -- here, it is k **(O+P)/P.
[0081] By these formulas, it is a display 1. Width of face P of the stripe pixel of the stripe image 11 to display Base length It is k if O is determined. It is determined and width-of-face B' of opening of a parallax barrier pattern is determined uniquely. Moreover, spacing D Observation distance C It is proportional.

[0082] Therefore, observation distance C It follows and is a display 1. Space light modulation element 2 which forms the parallax barrier pattern Spacing D The upper conditional expression can be satisfied by controlling.
[0083] For example, it is set to width of face of P= 0.330mm of a stripe pixel, O= 65mm of base lengths then, and k= 197.97, and is the 1st. In a location with an observation distance of C= 1000mm which is observation conditions, it is width-of-face B'=0.3283mm of D= 5.05 mm spacing and opening. Then, it is good. And an observer is the 2nd. It is spacing when it moves to a location with an observation distance of C= 1500mm which is observation conditions. D= 7.58mm and width-of-face B'=0.3283 of opening If it carries out, the upper conditional expression will be satisfied.
[0084] Moreover, in the equipment which follows a view location like this operation gestalt, and displays a solid image, if the location which forms opening of a parallax barrier pattern according to an observer's view location is appropriately shifted to a longitudinal direction to migration in an observer's longitudinal direction as shown in drawing 11, a solid image can be displayed good even in such a case.
[0085] Now and drawing 11 (A) As opening B' of a parallax barrier pattern shown in 51 in drawing so that it may be shown, it is the space light modulation element 2. 3 In forming by the pixel Drawing 11 (B) A view is A'R and A'L to width so that it may be shown. When it moves to a location, it is stripe image 11A about opening of a parallax barrier pattern. It receives and is 1 relatively. Only a pixel is shifted and it is 51'. If it forms so that it may be shown Even in such a case, stripe image 11A Stereoscopic vision can be carried out good. In addition, 52 and 52' It is as having mentioned above that it is a location used as opening of a time-sharing parallax barrier pattern.
[0086] Or it remains as it is and the location of opening of a parallax barrier pattern is a display 1. Even if it shifts the location of the stripe image 11 to display to a longitudinal direction, a solid image can be recognized good.
[0087] The operation gestalt 11 mentioned later is an operation gestalt which adopted the above approach.
[0088] Drawing 12 -14 are the operation gestalt 5 of the solid image display device of this invention. It is an explanatory view. At an old operation gestalt, it is a display 1. The parallax images R and LS for compounding the stripe image to display were always the same. That is, even if the observer changed the view location, they were the solid image display approach / equipment which does not produce change at all in the solid image currently observed and which can observe the always same solid image good.
[0089] On the other hand, the method of presentation which gives the surroundings lump display of the image according to view location change of an observer with this operation gestalt is used, and it responds to an observer's view location, and is a display 1. It differs in that the parallax images R and LS to display are changed.
[0090] drawing 12 -- operation gestalt 3 Or 4 Display 1 of the solid image display devices Space light modulation element 2 from -- only the becoming part is shown as an indicating equipment 20. an observer -- this display 20 to observation distance C only -- an image shall be observed from the distant location In addition, the image-processing means, the observation condition detection means, etc. are omitted.
[0091] On the other hand, drawing 13 is the important section schematic diagram of the parallax image source 15 of this operation gestalt. 12 are a photographic subject among drawing. KA, KB, KC, and KD -- respectively -- a camera -- it is -- a photographic subject 12 to distance C only -- the distant location -- respectively -- an observer's both-eyes spacing (base length) O At equal spacing, it arranged horizontally, arranges, and the photographic subject is picturized, respectively. In addition, A-D It is the before [the optical system of each camera] side principal point. Moreover, drawing 14 is 4. It is the explanatory view of the image which the cameras KA, KB, KC, and KD of a base picturize. Therefore, in the case of this operation gestalt, the parallax image source 15 is always 4. It has the original parallax image of **.
[0092] An operation of this operation gestalt is explained. an observer needs to pass a location 18 (the location of the left eye [in / in right eye AR' / a location 17] AL and a left eye are AL') now from the location 17 (a right eye is AR and a left eye is AL) of drawing 12 -- the case where it moves to a location 19 (the location of left eye AL' [in / in right eye AR" / a location 18] and a left eye are AL") is considered.
[0093] as the image RS which an observer's right eye AR observes on a display 20 when an observer is in a location 17 -- Camera KA -- point A from -- the picturized original parallax image (drawing 14 (A)) is inputted into a display 20. The original parallax image (drawing 14 (B)) photoed from Point B with Camera KB as an image LS observed by an observer's left eye AL to coincidence is inputted into a display 20.
[0094] And an indicating equipment 20 is a display 1. Above-mentioned drawing 14 (A) as a parallax image for

compounding the stripe image to display, and (B) 2 The original parallax image of ** is used and it is drawing 14 (A) as a right eye image. Considering an image as a left eye image, it is drawing 14 (B). A stripe image is compounded and displayed using an image. If it does in this way, an observer will observe the solid image when seeing a photographic subject from the location of Cameras KA and KB.

[0095] if an observer moves to a location 18 -- a display 20 top -- an observer's right eye AR' as the image RS to observe -- Camera KB -- point B from -- the picturized original parallax image (drawing 14 (B)) is inputted into a display 20. It is an observer's left eye AL' to coincidence. The original parallax image (drawing 14 (C)) photoed from Point C with Camera KC as an image LS to observe is inputted into a display 20.

[0096] And an indicating equipment 20 is a display 1. Above-mentioned drawing 14 (B) as a parallax image for compounding the stripe image to display, and (C) 2 The original parallax image of ** is used and it is drawing 14 (B) as a right eye image. Considering an image as a left eye image, it is drawing 14 (C). A stripe image is compounded and displayed using an image. If it does in this way, an observer will observe the solid image when seeing a photographic subject from the location of Cameras KB and KC.

[0097] if an observer moves to a location 19 -- a display 20 top -- an observer's right eye AR" as the image RS to observe -- Camera KC -- point C from -- the picturized original parallax image (drawing 14 (C)) is inputted into a display 20. It is an observer's left eye AL" to coincidence. The original parallax image (drawing 14 (D)) photoed from Point D with Camera KD as an image LS to observe is inputted into a display 20.

[0098] And an indicating equipment 20 is a display 1. Above-mentioned drawing 14 (C) as a parallax image for compounding the stripe image to display, and (D) 2 The original parallax image of ** is used and it is drawing 14 (C) as a right eye image. Considering an image as a left eye image, it is drawing 14 (D). A stripe image is compounded and displayed using an image. If it does in this way, an observer will observe the solid image when seeing a photographic subject from the location of Cameras KC and KD.

[0099] what consisted of parallax images which looked at the photographic subject from the direction where the solid images to observe differ when the observer moved and the view location was changed by the above actuation -- becoming -- a photographic subject 12 -- " -- turning -- being crowded -- " -- the solid image to see is observable.

[0100] At this operation gestalt, the parallax image source 15 is 4. It has the parallax image information which consists of the original parallax image of **. And it is 4 by the signal from the observation condition detection means 30. It is 2 from the original parallax image of **. It is used choosing the parallax image of ** and the solid image is displayed.

[0101] The before [each camera which constitutes the parallax image source 15 from this operation gestalt] side principal point location A, B, and C, and D Each eyes AR and AL (=AR') in each observation location, AL' (= AR"), and AL" Although it is made in agreement For example, an observer's right eye is between AR and AL(s) of a location 17, and a left eye is AR' and AL' of a location 18. When it is in between, as the right eye image RS -- drawing 14 (A) A original parallax image and drawing 14 (B) 2 of a original parallax image "interpolation" of a original parallax image to the image of ** -- carrying out -- 1 The right eye image (parallax image) RS of ** is compounded. It is drawing 14 (B) as a left eye image LS. A original parallax image and drawing 14 (C) 2 of a original parallax image A original parallax image to the image of ** is interpolated, and it is 1. The left eye image (parallax image) LS of ** is compounded. Thus, 2 which compounded newly and was created The parallax images R and LS of ** are used and it is a display 1. By compounding and displaying the stripe image to display, the surroundings lump effectiveness of the smoother continuous image is realizable.

[0102] As the approach of this image interpolation, it is the approach using an EPI Poral plane image (EPI) better known than before, i.e., EPI. The approach (55 1 .Bolles et.al : for example, R.C Int.J.Computer Vision, Vol. No. 1, pp.7- 1987 publication) of searching a top for corresponding points and creating a interpolation image etc. can be used.

[0103] 4 shown in drawing 13 when the technique of this image interpolation is used It is not necessary to photo a photographic subject 12 by the camera system of a base for example, and is Point A. Point D 2 photoed with the camera of a location It can carry out by the ability repeating image interpolation using the original parallax image of **, a desired parallax image can be formed, and a stripe image can be compounded after this. (In addition, it carries out creating a parallax image with interpolation further to calling it "reconstruction of an image" by this invention using the parallax image created with interpolation.)

Moreover, also when an observer moves to a cross direction, it is also possible to perform same image interpolation, to form the parallax image according to each view location, and to compound a stripe image after

this, and these people as the approach of these image processings It is more effective if the approach currently indicated by JP,7-129792,A is used.
[0104] moreover, operation gestalt 5 **** -- as the image to display -- 4 although the natural image photoed with the camera of a base is used -- CAD etc. -- 3, such as the so-called CG image created by computer, A dimension image can also be used. In this case, the "data" of a photographic subject is already 3. What is necessary is "to be able to generate" freely the parallax image seen from the location of arbitration, to generate two or more parallax images corresponding to each view location, and just to compound and display a stripe image from this, since it is dimension data.
[0105] If the parallax barrier method is used and a multi-image display (called a parallax panorama gram) is performed, in order to make a viewing area large conventionally or to give the "surroundings lump effectiveness", when the number of the parallax images then used will be set to n, it is 1/n about the resolution of a display. It was falling.
[0106] on the other hand -- this operation gestalt -- the fall of resolution -- at least 2 a part -- 1 it is . Furthermore, this operation gestalt is the operation gestalt 3. Or 4 Since the configuration is used, the fall of resolution has been prevented, and it is the operation gestalt 2 further. The brightness of an image will also be raised if a configuration is adopted.
[0107] Drawing 15 is the operation gestalt 6 of the solid image display device of this invention. It is the explanatory view of the solid image display approach. The configuration of this operation gestalt is the operation gestalt 1. Although it is the same, it is the operation gestalt 1. Display 1 Image display and space light modulation element 2 With this operation gestalt, the points synchronized and displayed for every scanning line differ to having displayed the display of a parallax barrier pattern synchronously for every pixel on the scanning line.
[0108] Drawing 15 (A) Operation gestalt 1 Drawing 2 It is in the same display condition as the shown display condition. this condition -- an observer -- space light modulation element 2 The 1st formed parallax barrier pattern 2A -- minding -- the 1st Stripe image 11A **** -- by things, the parallax image corresponding to an eye on either side can be observed by the eye on either side, and stereoscopic vision can be performed.
[0109] moreover, this operation gestalt -- drawing 15 (B) a condition -- the 2nd parallax barrier pattern 2B -- minding -- the 2nd Stripe image 11B **** -- things can perform stereoscopic vision of **. At this operation gestalt, it is a display 1. The stripe image 11 and the space light modulation element 2 to display It displays by synchronizing the light transmission section of the formed parallax barrier pattern for every scanning line, and is drawing 15 (A). The condition which shows, and drawing 15 (B) The condition which shows, and 2 The display condition of ** is repeated by turns and displayed.
[0110] that is, a certain time of day -- setting (at the time of the display condition of drawing 15 (A)) -- display 1 a certain scanning-line top -- stripe pixels Ri and Li of the parallax images RS and LS R1L2R3L4 -- the 1st compared with .... Stripe image The applicable part of 11A is displayed. It is the space light modulation element 2 to coincidence. On the correspondence scanning line, it is Point G. Close (optical protection-from-light section), open (light transmission section), close, and the open .... The light transmission section and the optical protection-from-light section are repeated and displayed in sequence, and it is the 1st. Parallax barrier pattern 2A is formed. this time -- a right eye AR -- stripe pixel R1R3R5 -- the right eye image which consisted of .... incidence -- carrying out -- a left eye AL -- the stripe pixel L -- only the left eye image which consisted of .... 2L4 L6 can carry out incidence, and can carry out stereoscopic vision. (However, a right eye image and a left eye image are one half of the resolution of the screen of a display 1, respectively.)
1 In Time of Day Which Finishes Carrying Out Frame Scanning and is Scanning the Again Same Scanning Line as above (at the Time of Display Condition of Drawing 15 (B)) display 1 this scanning-line top -- stripe pixels Ri and Li of the parallax images RS and LS L1R2L3R4 -- the 2nd compared with .... Stripe image 11B is displayed. It is the space light modulation element 2 to coincidence. On the correspondence scanning line, it is Point G. Open, close, open, and the close .... The light transmission section and the optical protection-from-light section are repeated in sequence. The 2nd Parallax barrier pattern 2B is formed (the light transmission section and the optical protection-from-light section have a reverse relation mutually by this 2nd parallax barrier pattern 2B and 1st parallax barrier pattern 2A). this time -- a right eye AR -- stripe pixel R2R4R6 -- the parallax image for right eyes which is .... and was constituted -- incidence -- carrying out -- a left eye AL -- stripe pixel L1L3L5 -- only the parallax image for left eyes which consisted of .... can carry out incidence, and can carry out stereoscopic vision similarly.

[0111] this 2 displaying the display condition of ** by time sharing by turns by the high-speed frame rate -- a right eye -- stripe pixel R1R2R3R4 -- all the parallax images RS that consisted of .... a left eye -- stripe pixel L1L2L3L4 -- all the parallax images LS that consisted of .... observe, respectively -- having -- display 1 A high-definition solid image can be observed without dropping display resolution.
[0112] The resolving power of the image which appears from an eye on either side in the conventional solid image display approach is one half of the display resolution of the display to be used. It is [as opposed to / at this operation gestalt / it] 2 although it was falling. It is a twice as many highly minute image as this.
[0113] It is the display 1 of this operation gestalt by drawing 16. Space light modulation element 2 A switch of a display is explained in more detail. Here, it is drawing 3. The case where it is driving by the no interlace using the shown circuitry is shown. drawing of the inside of drawing, and the left -- display 1 a display condition -- being shown -- right drawing -- space light modulation element 2 The parallax barrier pattern to display is shown.
[0114] Drawing 16 (A) and (C) It is a display 1, respectively. A screen is the 1st. Stripe image 11A and the 2nd Stripe image 11B The condition of having switched completely is shown and it is drawing 16 (B). It is the 5th while performing the middle scan. The display condition of the time of day which finished scanning the scanning line Y5 is illustrated.
[0115] drawing 16 (A) it is shown -- as -- a certain time of day -- setting (time of day which the scan of a full screen finished) -- display 1 **** -- R1L2R3L4 -- the 1st located in a line with .... Stripe image 11A it displays over the whole surface -- having -- space light modulation element 2 **** -- opening-and-closing opening and closing -- the 1st with which the ... and stripe-like pattern was located in a line Parallax barrier pattern 2A is displayed.
[0116] and the degree from this condition -- the 1st the scanning line Y1 -- choosing -- this display 1 a scanning-line Y1 top -- L1R2L3R4 -- the 2nd located in a line with .... while displaying the applicable part of a stripe image -- space light modulation element 2 a scanning-line Y1 top -- the open-close-open close -- the 2nd located in a line with .... The applicable part of parallax barrier pattern 2B is displayed synchronizing with the scanning line. They are the scanning lines Y1 and Y2 about this.... It repeats successively and is the 5th. The display condition of the time of day which finished scanning the scanning line Y5 is drawing 16 (B). It is a condition.
[0117] At this operation gestalt, it is a display 1 to this appearance. Space light modulation element 2 For every scanning line, a synchronization is taken and it indicates by drive. and the condition of having finished displaying all the scanning lines -- drawing 16 (C) it is -- display 1 **** -- drawing 16 (A) The 1st shown Stripe image 11A The 2nd which complements mutually and suits Stripe image 11B It is displaying. and drawing 16 (A) the stripe pixels R1, R3, and R5 of the No. odd eye of the right parallax image RS -- having displayed .... receiving -- drawing 16 (C) **** -- the stripe pixels R2, R4, and R6 of the No. even eye of the right parallax image RS .... is displayed. moreover, drawing 16 (A) the even-numbered stripe pixels L2 and L4 of the left parallax image LS, and L6 -- having displayed .... receiving -- drawing 16 (C) a condition -- the odd-numbered stripe pixels L1, L3, and L5 of the left parallax image LS .... is displayed.
[0118] After a series of scans (rewriting display of all the scanning lines) are completed by this, it means that the right parallax image RS and the left parallax image LS were displayed on all the pixels that constitute a display 1.
[0119] light modulation element 2 between this space-time since the parallax barrier pattern to form also take , switch and show the synchronization for every scanning line , it be this space light modulation element 2 . even if it mind and observe the stripe image under rewriting and after rewriting , stereoscopic vision can be carry out without produce most cross talks based on the principle of the parallax barrier method , and the high definition solid image displayed on all the pixels of a display can be see .
[0120] It sets in this operation gestalt and is a display 1. 1 Display width of face P of the stripe pixel which constitutes a right-and-left parallax image in a pixel It is made in agreement and, moreover, is the space light modulation element 2. 1 of the screen Although the pixel was made to correspond to the display width of face of the light transmission section and the optical protection-from-light section of a parallax barrier pattern Formation of a parallax barrier pattern is not what is restricted to this. For example, as shown in drawing 17, it is the display width of face P of a stripe pixel. Display 1 It is the space light modulation element 2 about display width-of-face B' of the light transmission section and the optical protection-from-light section of a parallax barrier pattern to also make it correspond to two or more pixels. It can also be made to correspond to two or

more pixel width of face. And this is the display width of face P which it can choose mutually-independent and is a stripe pixel. Display 1 1 It is made the width of face of a pixel and is the space light modulation element 2 about display width-of-face B' of the light transmission section and the optical protection-from-light section of a parallax barrier pattern. It can also be made to correspond to two or more pixel width of face. This is applicable to all the operation gestalten of this invention.

[0121] Drawing 18 is the operation gestalt 7 of the solid image display device of this invention. It is the explanatory view of the solid image display approach. The configuration of the equipment of this operation gestalt is the operation gestalt 6 fundamentally. It is the same. However, operation gestalt 6 It sets and is a display 1. It is stripe image 11A to the whole surface. Or 11B While displaying, it is the space light modulation element 2 by scanning-line synchronization. It is a display 1 by forming parallax barrier pattern 2A or 2B all over the screen. The solid image was displayed over the whole screen surface. On the other hand, this operation gestalt is a display 1 so that the window of a computer may be opened. A solid image can be displayed only on the part on the screen. This point is the operation gestalt 6. It differs.

[0122] It is a display 1 as this operation gestalt is shown in drawing on the left of drawing 18 with the observation condition input means 9 at the beginning of actuation of a solid image display device. The range (field) 41 which displays a solid image on the screen is inputted. And a stripe image is displayed only on the field and it is 2 in other fields. A dimension image (non-stripe image) is displayed. It is the space light modulation element 2 to coincidence. Upper display 1 A parallax barrier pattern is formed only in the field 42 corresponding to a field 41, and other fields are changed into a light transmission condition. In the part as which a solid image is observed by this from a stripe image only to the desired field 41, and the stripe image is not displayed, it is 2. A dimension image is observable.

[0123] In this operation gestalt, the display of the solid image to a field 41 top is faced, and it is the operation gestalt 6. It is a display 1 as explained. And space light modulation element 2 It displays by taking a synchronization for every scanning line. drawing 18 -- the field 41 whole surface -- a stripe pixel -- L -- one R2L3R4L5R6 -- the 2nd located in a line with .. Stripe image 11B From the condition of having displayed It moves to the next image display and is the 4th. A stripe pixel is R1L2R3L4R5 L6 from the scanning line to a field 41 one by one.. The 1st located in a line Stripe image 11A It switches and displays. It synchronizes with this scanning line at coincidence, and is the space light modulation element 2. The light transmission section and the optical protection-from-light section of an applicable part are switched, and it goes, and is this The 5th The moment of finishing scanning to the scanning line Y5 is illustrated typically.

[0124] This operation gestalt is a display 1. While displaying a solid image on a part and being able to perform the mixture display of a solid image and a non-solid image Display 1 The stripe image 11 and the space light modulation element 2 which are displayed on a field 41 Since a synchronization is taken and the parallax barrier pattern formed in a field 42 is displayed for every scanning line Even if it observes the stripe image displayed partially, stereoscopic vision can be carried out without producing a cross talk based on the principle of the parallax barrier method.

[0125] The magnitude of the viewing area 41 of the solid image partially displayed in this operation gestalt is a display 1. What is necessary is just in display screen size, and the two-dimensional display position on the display screen can also be suitably chosen in the display screen.

[0126] In addition, the width of face P, number, and display 1 of a stripe pixel The field which displays a stripe image in a top is the component of a stripe image, and is width-of-face B' of the opening and the protection-from-light section of a parallax barrier pattern, and the space light modulation element 2. The field which forms a PARARARAKKUSU barrier pattern in a top is the component of an opening pattern.

[0127] In addition, it is the operation gestalt 1 in this case. It is a display 1 similarly. Space light modulation element 2 It is also possible to take and drive a synchronization for every pixel.

[0128] Drawing 19 is the operation gestalt 8 of the solid image display device of this invention. It is the explanatory view of the solid image display approach. The configuration of the equipment of this operation gestalt is the operation gestalt 7 fundamentally. It is the same. However, this operation gestalt is the operation gestalt 7. A different point is usual 2 at this operation gestalt. The field 1 which displays a dimension image (non-stripe image), i.e., a display, It is the point which always forms a parallax barrier pattern also to fields other than field 41. It is a display 1 like the operation gestalt 7 also here. The case where a solid image is displayed only on the field 41 on the screen is explained.

[0129] It is drawing 19 (A) first. It explains. this operation gestalt -- setting -- drawing 19 (A) it is shown in left

drawing -- as -- display 1 **** -- the 1st The scanning line Y1 to the 3rd 2 [usual until the scanning line Y3] A dimension image is displayed. this time -- drawing 19 (A) it is shown in the right figure -- as -- space light modulation element 2 **** -- display 1 the timing which scans each scanning line -- a synchronization -- taking -- each pixel on each scanning line -- opening-and-closing opening and closing -- the 1st of the shape of a stripe, ..., Parallax barrier pattern 2A is displayed over the whole scanning line.

[0130] and the 4th the time of scanning the scanning line Y4 -- display 1 **** -- display 1 The 1st A pixel X1 to the 6th .. (in practice -- R -- although it is .. 1L2R3L4R5 L6, it is outlining like the point) is displayed. up to a pixel X6 -- the stripe pixel RLRLRL -- the 7th the 12th from a pixel X7 -- pixel X12 ****** -- 2 The image corresponding to a part for this picture element part of a dimension image is displayed.

[0131] and space light modulation element 2 **** -- this display 1 the timing of the scanning line -- a synchronization -- taking -- the 4th the scanning line Y4 -- the 1st the 12th from a pixel X1 -- pixel X12 up to -- all pixels -- opening-and-closing opening and closing -- the 1st of ... Parallax barrier pattern 2<SUB>A is displayed. They are same scan and display The 5th The scanning line Y5 to the 8th The condition of having carried out to the scanning line Y8 is drawing 19 (A). It is in the condition to illustrate.

[0132] Next, drawing 19 (B) It explains. Drawing 19 (A) The 8th After the scan to the scanning line Y8 finishes, it is the 1st again. It scans from the scanning line Y1. this time -- the 1st The scanning line Y1 to the 3rd the scan to the scanning line Y3 -- display 1 **** -- usual 2 [same with a front] although a dimension image is displayed -- space light modulation element 2 **** -- the open-close-open close -- the 2nd of ... Parallax barrier pattern 2B is displayed over the whole scanning line. and the 4th the time of scanning the scanning line Y4 -- the 1st -- pixel X1 to the 6th up to a pixel X6 -- the stripe image LRLRLR .. (in practice -- L -- one R2L3R4L5R6 -- although it is .., it is outlining like the point) -- displaying -- the 7th the 12th from a pixel X7 -- pixel X12 ****** -- above 2 The image corresponding to a part for this picture element part of a dimension image is displayed.

[0133] and this display 1 the timing of the scanning line -- a synchronization -- taking -- space light modulation element 2 The 4th the scanning line Y4 -- the 1st the 12th from a pixel X1 -- pixel X12 up to -- all pixels -- the open-close-open close -- the 2nd of ... Parallax barrier pattern 2B is displayed. And they are same scan and display The 5th The condition of having carried out to the scanning line Y5 is drawing 19 (B). It is in the shown condition.

[0134] And the condition of carrying out by repeating this scan and display, and having finished scanned and displaying the last scanning line Y8 is drawing 19 (C). It is in the shown condition.

[0135] It sets to the field 41 which displays this solid image, and is the operation gestalt 1. After a series of scans (rewriting display of all the scanning lines) are completed similarly, the right parallax image RS and the left parallax image LS will be displayed on all the pixels in a field 41. Therefore, this operation gestalt can display a high definition solid image with few cross talks of a right-and-left image in the three dimentional display field 41 while being able to perform the mixture display of a solid image and a non-solid image.

[0136] Furthermore, this operation gestalt is the space light modulation element 2. Since a parallax barrier pattern is displayed on the whole surface, it is the operation gestalt 7. A barrier drive circuit becomes easy.

[0137] Although the old operation gestalt was the solid image display device of a no interlace drive, it is also possible to constitute the solid image display device of this invention using an interlace drive.

[0138] Drawing 20 is the operation gestalt 9 of the solid image display device of this invention. It is the explanatory view of the solid image display approach. Drawing 20 (A) - (D) Drawing which is each the left is a display 1. About a display condition, right drawing is the space light modulation element 2, respectively. The parallax barrier pattern to form is shown. The configuration of this operation gestalt is the operation gestalt 6 fundamentally. It is the same. This operation gestalt is the operation gestalt 6. A different point is a point which shows the solid image using interlace scanning, and others are the same.

[0139] Drawing 20 (A) and (D) It is the operation gestalt 6, respectively. Drawing 16 (A) and (C) It is the same as a condition. Drawing 20 (B) It sets in this operation gestalt and is a display 1. And space light modulation element 2 The condition of having finished scanning the odd number scanning line is shown, and it is drawing 20 (C). Two among the even number scanning lines The condition of having finished scanning Rhine (scanning lines Y2 and Y4) is shown.

[0140] Drawing 20 (A) So that it may be shown at a certain time of day (time of day which the scan of a full screen finished) display 1 **** -- a stripe pixel -- RLRL -- the 1st located in a line with .... (in practice -- R1L2R3L4 -- it is outlining like the point although it is ..) Stripe image 11A Display 1 It is displayed over the

whole surface. space light modulation element 2 **** -- opening-and-closing opening and closing -- the 1st of the shape of a stripe, ..., Parallax barrier pattern 2A is displayed.
[0141] And it is the odd number scanning line, for example, the 1st, next. The scanning line Y1 is chosen. display 1 The 1st the part of the scanning line Y1 -- a stripe pixel -- LRLR -- the 2nd located in a line with .... (in practice -- L1R2L3R4 -- it is outlining like the point although it is ..) Stripe image 11B While displaying an applicable part space light modulation element 2 The 1st the part of the scanning line Y1 -- the open-close-open close -- the 2nd of the shape of a stripe located in a line with ..... The applicable part of parallax barrier pattern 2B is displayed. Thus, display 1 Space light modulation element 2 For every scanning line, a synchronization is taken and it indicates by drive. the thing illustrating the display condition in the time of day which finished scanning all the scanning lines for this repeatedly to the odd number scanning line one by one -- drawing 20 (B) it is .
[0142] and a degree -- the even number scanning line and the 2nd the scanning line Y2 chooses -- having -- display 1 The 2nd the part of the scanning line Y2 -- a stripe pixel -- LRLR -- the 2nd located in a line with .... Stripe image 11B while displaying an applicable part -- space light modulation element 2 The 2nd the part of the scanning line Y2 -- the open-close-open close -- the 2nd located in a line with ..... The applicable part of parallax barrier pattern 2B is displayed. this -- the even number scanning line -- receiving -- one by one -- repeating -- the 4th the thing illustrating the display condition of the time of day which finished scanning the scanning line Y4 -- drawing 20 (C) it is .
[0143] and the condition of having finished scanned and displaying all the even number scanning lines -- drawing 20 (D) it is -- display 1 **** -- drawing 20 (A) The 1st shown Stripe image 11A The 2nd which complements mutually and suits Stripe image 11B It is displaying. moreover, space light modulation element 2 **** -- the 2nd Parallax barrier pattern 2B is displayed.
[0144] After a series of scans (rewriting display of all the scanning lines) are completed by this, it means that the right parallax image RS and the left parallax image LS were displayed on all the pixels of a display 1.
[0145] Stereoscopic vision can be carried out without producing a cross talk based on the principle of the parallax barrier method, even if an observer observes under rewriting and the rewritten stripe image through this parallax barrier pattern, since the parallax barrier pattern also takes and shows the synchronization for every scanning line at this time, and it is a display 1. The solid image displayed on all pixels can be seen.
[0146] Thus, when it displays using an interlace drive, the odd number scanning line and the even number scanning line can be displayed by turns for every field, and it is a display 1. Space light modulation element 2 It carries out, and even if a display speed uses a late liquid crystal device etc. somewhat, the display of a high definition solid image without a flicker is attained.
[0147] This method of presentation is the operation gestalt 7. Operation gestalt 8 It is applicable also to the approach of displaying a solid image on the part on the screen of the explained display.
[0148] Moreover, this interlace drive is the operation gestalt 1. It is applicable also to the approach of taking and displaying a synchronization for every pixel.
[0149] Drawing 21 is the important section schematic diagram of the operation gestalt 10 of the solid image display device of this invention. Moreover, drawing 22 is the explanatory view of the solid image display approach of this operation gestalt. In addition, display 1 of this operation gestalt And space light modulation element 2 Arrangement etc. is the operation gestalt 6. It is the same. Moreover, it is the operation gestalt 1 also to this operation gestalt. It is not illustrating, although there are the observation condition input means 9 and the parallax image source 15 similarly. At this operation gestalt, it is a display 1. Space light modulation element 2 In the case of an old operation gestalt, 90 degrees rotated and the direction of the scanning line and the data line is set up. That is, with this operation gestalt, it scans in the direction of a vertical.
[0150] The method of presentation is explained. Drawing 22 (A) It sets at a certain time of day so that it may be shown, and it is the 1st. The scanning line Y1 is chosen and it is a display 1. The 1st The 1st on the scanning line Y1 The stripe pixel R1 of the right parallax image RS is altogether displayed from a pixel X1 to the last pixel X8. light modulation element 2 between this space-time **** -- drawing 22 (B) it is shown -- as -- space light modulation element 2 The 1st The 1st on the scanning line Y1 The optical protection-from-light section is formed from a pixel X1 to the last pixel X8. Next, the 2nd The scanning line Y2 is chosen and it is the 2nd to a display 1. The 1st on the scanning line Y2 The stripe pixel L2 of the left parallax image LS is altogether displayed from a pixel X1 to the last pixel X8, and it synchronizes with this, and is the space light modulation element 2. The 2nd The light transmission section is formed in all the pixels on the scanning line Y2.

[0151] The same drive is performed one by one and all displays are performed. At drawing 22, it is the 7th. The condition of having finished scanning the scanning line Y7 is shown.
[0152] At this operation gestalt, it is a display 1 to this appearance. Space light modulation element 2 A synchronization is taken for every scanning line Yi, and it is stripe image 11A. Or 11B And by forming parallax barrier pattern 2A or 2B, an observer can see a solid image with few cross talks.
[0153] If the scanning line is set as a lengthwise direction like this operation gestalt so that clearly from drawing The stripe image and parallax barrier pattern which are displayed on each scanning line are continued for all the pixels on the scanning line. Parallax images RS and LS on either side 1 Since it is either the stripe pixel Ri or Li and the light transmission section of **, or the optical protection-from-light section The one scanning line is accompanied like an old operation gestalt, and it is RLRLRL about the applicable part of a stripe image... It is not necessary to arrange and display by turns or to display [do not need to form the optical protection-from-light section and the light transmission section, and] them by turns, and a display circuit can be simplified.
[0154] in addition -- this operation gestalt -- image-processing means 3 from -- although the case where it drove with a synchronizing signal was shown -- the drive approach -- display drive circuit 4 a synchronizing signal is generated -- making -- barrier drive circuit 5 taking the timing of a drive **** -- Y The various drive approaches, such as taking a synchronization with a driver, can be used.
[0155] At this operation gestalt, it is the 1st. Although the same drive approach as the no interlace sequentially scanned from the scanning line Y1 is used, after displaying the odd number scanning line, the drive approach like the interlace which displays the even number scanning line can also be used.
[0156] Drawing 23 is the important section schematic diagram of the operation gestalt 11 of the solid image display device of this invention. This operation gestalt is the operation gestalt 6. It is made to develop, an observer's view location is detected, it responds to an observer's view location, and they are a parallax barrier pattern and a display 1. It is the operation gestalt which controls a relative location with the stripe image to display, and could be made to carry out stereoscopic vision over the large range.
[0157] the inside of drawing, and 30 -- operation gestalt 3 It is the explained observation condition detection means, and an observer's image is photoed with a camera, an image processing extracts the image of an observer's eye from this input image, and an observer's view location is detected. 9 It is a ****** condition input means and input an observer's view location by the manual according to a case. 44 -- the operation means of an image location and a barrier location -- it is -- the observation condition detection means 30 or observation condition input means 9 from -- view positional information -- being based -- a parallax barrier pattern and display 1 the optimal relative physical relationship of the stripe image to display -- calculating -- the barrier positioning control circuit 45 and image-processing means 3 A signal is outputted. The barrier positioning control circuit 45 is based on this signal, and is the barrier drive circuit 5. It controls and is the space light modulation element 2. A upwards suitable parallax barrier pattern is formed.
[0158] 81 82 Space light modulation element 2 X It is a driver. X A driver 81 drives odd pixels and is X. A driver 82 drives even pixels.
[0159] In addition, a display 1 and the space light modulation element 2 Arrangement etc. is the operation gestalt 6. It is the same.
[0160] An operation of this operation gestalt is explained. drawing 23 -- setting -- the observation condition detection means 30 or observation condition input means 9 An observer's view positional information is inputted into the operation means 44 of an image location and a barrier location. from -- The operation means 44 of an image location and a barrier location is based on this view positional information, and is a display 1. The stripe image 11 and the space light modulation element 2 to display The optimal relative location of the parallax barrier pattern to form, for example, the light transmission section, is calculated. The barrier positioning control circuit 45 and image-processing means 3 A signal is outputted, the barrier positioning control circuit 45 is based on this signal, and it is the barrier drive circuit 5. It controls and is the space light modulation element 2. A parallax barrier pattern is formed in the upper, optimal location.
[0161] It is the image-processing means 3 to coincidence. It is based on a signal from the operation means 44 of an image location and a barrier location, and is a display 1. A stripe image is displayed on the upper, optimal location.
[0162] Drawing 24 is the display 1 in the case of driving by no interlace. A display condition (drawing 24 (A)) and space light modulation element 2 The parallax barrier pattern (drawing 24 (B)) formed is shown.
[0163] And drawing 24 (C) When an observer moves to a longitudinal direction, the view location is detected,

and it is the space light modulation element 2. It is the location of the parallax barrier pattern to form to a longitudinal direction 1 The condition of driving so that pixel migration may be carried out is shown. In addition, all drawing 24 is the 5th. The display condition of the time of day which finished scanning the scanning line Y5 is expressed typically.

[0164] It sets in this operation gestalt and is a display 1. Width of face P of each stripe pixel to display Display 1 It is set as width of face of 1 pixel, and is the space light modulation element 2. It is the space light modulation element 2 about width-of-face B' of the light transmission section of the parallax barrier formed, or the optical protection-from-light section. 2 It is set as the pixel width of face of **.

[0165] Drawing 25 is an explanatory view which moves a parallax barrier pattern in this operation gestalt corresponding to migration of a view location. drawing -- the 1st The relation between the stripe image and parallax barrier pattern in a certain part meeting the scanning line Y1, and an observer's view location is shown.

[0166] It is a display 1 when an observer moves in this operation gestalt. The stripe image to display is fixed and it is the space light modulation element 2. The case where the location of the light transmission section of the parallax barrier pattern to form is controlled in the optimal location is explained. Drawing 25 (A) An observer looks at the right stripe pixel R3 through the light transmission section 51 by the right eye AR, looks at the left stripe pixel L2 through the light transmission section 51 by the left eye AL, and is observing the solid image so that it may be shown.

[0167] This condition to drawing 25 (B) An observer's eye is lateral A'R and A'L so that it may be shown. Suppose that it moved. Space light modulation element 2 Light transmission section 51' of the parallax barrier pattern to form Space light modulation element 2 Only width of face Pb of 1 pixel moves and forms in a longitudinal direction. To the appearance explained with said operation gestalt, the drive of this scanning line is a display 1. It is driving synchronizing with the scan. An observer is right eye A'R by this. The right stripe pixel R3 is seen through light transmission section 51', and it is light transmission section 51' at left eye A'L. It lets it pass, the left stripe pixel L2 is seen, and a solid image can be observed.

[0168] At this time, it is the space light modulation element 2. It is the space light modulation element 2 about the light transmission section or the optical protection-from-light section of a parallax barrier pattern to form. If constituted from two or more pixels, since a parallax barrier pattern is delicately movable, it is convenient.

[0169] Moreover, contrary to the upper example of explanation, when a view location moves, the location of the light transmission section of a parallax barrier pattern remains as it is, and it is a display 1. The location of the stripe image to display may be shifted to a longitudinal direction. At this time, it is a display 1. It is a display 1 about the stripe pixel to display. It is convenient, if it constitutes so that it may display by two or more pixels. That is, display 1 Display width of face P of the stripe pixel to display Display 1 It considers as the width of face of two or more pixels.

[0170] as mentioned above , since an observation condition detection means detect an observer view location automatically , control the display position of a stripe image , and the formation location of a parallax barrier pattern and he be try to always observe a parallax image on either side correctly from an observer view location even if an observer view move in this operation gestalt , the range which can observe a stereoscopic model become very large . That is, this operation gestalt is at least 1 of the component of a stripe image, and the component of a parallax barrier pattern by the signal from an observation condition detection means or an observation condition input means. It is moving in the range which controls **, follows migration of an observer's view location, and can observe a stereoscopic model.

[0171] In addition, while acquiring distance information by the principle of triangulation using two or more cameras as an observation condition detection means 30, the approach of detecting an observer's view location can also be used.

[0172] Moreover, it is also possible to form the magnetic field in an observer's perimeter, to make an observer's head equip with a magnetic sensor, and to use the output from this sensor. Moreover, an observer is able to control an adjustment switch etc., observing a display image besides establishing an observation condition detection means as mentioned above.

[0173] Drawing 26 is the important section schematic diagram of the operation gestalt 12 of the solid image display device of this invention. The configuration of equipment is a display 1. Space light modulation element 2 A drive circuit is removed and it is the operation gestalt 6. It is the same. In addition, the observation condition input means 9 and the parallax image source 15 are not illustrated. This operation gestalt is the operation gestalt 6. It receives and is a display 1. Space light modulation element 2 X A driver and Y It is a

driver, respectively 2 They are ****** and the display screen 2 The points which divide and carry out a display drive differ. for example, the liquid crystal display of VGA (640 x480 pixel) -- display 1 And space light modulation element 2 ****** -- the case where it uses -- these -- 320 Y corresponding to the scanning line of a book Driver 71a and 71b And 72a and 72b 2 It divides into the part of **, respectively and drives into it. this operation gestalt -- a no interlace -- driving -- **** -- drawing 27 (A) and (B) Display 1 of this operation gestalt Space light modulation element 2 The display condition is shown.

[0174] a certain scan time of day -- setting -- display 1 **** -- image-processing means 3 from -- a picture signal is inputted based on a synchronizing signal, and the stripe image created from the parallax image on either side is displayed. Drawing 27 (A) It is Y then. Driver 71a and 71b The 2nd Scanning lines Ya2 and Yb2 The condition of having finished scanning is illustrated.

[0175] The method of presentation is explained. a certain time of day (time of day which the scan of a full screen finished) -- display 1 a top -- a stripe pixel -- R1L2R3L4 -- the 1st located in a line with .... Stripe image 11A Suppose that it is displaying over the whole display surface. again -- Y Driver 71a and 71b The 1st The scanning lines Ya1 and Yb1 the time of choosing and scanning -- a stripe pixel -- L1R2L3R4 -- the 2nd located in a line with .... Stripe image 11B An applicable part is displayed. Subsequently, the 2nd Scanning lines Ya2 and Yb2 It chooses and scans and is the 2nd. Stripe image 11B An applicable part is displayed. Drawing 27 (A) The condition at this time is illustrated.

[0176] Space light modulation element 2 A parallax barrier pattern is formed similarly. namely, -- a certain time of day (time of day which the scan of a full screen finished) -- space light modulation element 2 **** -- the protection-from-light section and a translucent part -- opening-and-closing opening and closing -- the 1st of the shape of a stripe located in a line with ... Parallax barrier pattern 2A is displayed. and -- again -- Y Driver 72a and 72b The 1st The scanning lines Ya1 and Yb1 the time of being chosen and scanned -- the protection-from-light section and a translucent part -- the open-close-open close -- the 2nd of the shape of a stripe located in a line with ... Parallax barrier pattern 11B It displays. Subsequently, the 2nd Scanning lines Ya2 and Yb2 A selection **** scan is carried out and it is the 2nd on it. Parallax barrier pattern 11B It displays. Drawing 27 (B) The condition at this time is illustrated.

[0177] At this time, it is a display 1. Space light modulation element 2 Y Driver 71a and 71b And 72a and 72b The 2nd The scanning line Ya2 and Yb2 Image-processing means 3 A synchronization is taken and it indicates by drive. That is, it sets in this operation gestalt and is 4. The scanning line of a book is scanned at this time of day. For the reason, the data line (X driver) is also Y. It corresponds to a driver and is 2, respectively. **********.

[0178] thus, display 1 Space light modulation element 2 the display screen -- 2 dividing and carrying out a display drive -- 2 a twice as many drive speed as this -- a display -- it can carry out -- operation gestalt 6 etc. -- it compares and solid image display with still few flickers becomes possible.

[0179] At this operation gestalt, it is a display 1. Space light modulation element 2 Although the case where took a synchronization and it indicated by drive for every scanning line was explained, it is the operation gestalt 1. 1 used It is also possible to use the approach of taking a synchronization and indicating by drive for every pixel.

[0180] Drawing 28 is the explanatory view of the display condition of the operation gestalt 13 of the solid image display device of this invention. Drawing 28 (A) and (B) It is a display 1, respectively. Space light modulation element 2 The display condition is illustrated. The configuration of this operation gestalt is the operation gestalt 1 fundamentally. It is the same. However, at this operation gestalt, it is a display 1. Space light modulation element 2 1 In case a synchronization is taken and it indicates by drive for every pixel, it is the space light modulation element 2. It differs in that the optical protection-from-light section (close) is indicated by precedence over several pixels.

[0181] display 1 **** -- Drawing 28 (A) To the first scanning line Y1, so that it may be shown a stripe pixel -- R -- the 1st located in a line with .... (drawing -- RLRLRL -- it is written as ...) 1L2R3L4R5 L6 Stripe image 11A While displaying an applicable part space light modulation element 2 The 1st the scanning line Y1 -- drawing 28 (B) it is shown -- as -- opening-and-closing opening-and-closing opening and closing -- the 1st which arranged the ... and light protection-from-light section and the light transmission section in by turns The applicable part of stripe barrier pattern 2A is displayed. And it is the 2nd in the case of a no interlace drive. The scanning line Y2 is chosen and it is the 1st. It is the 1st like the scanning line. Stripe image 11A An applicable part and the 1st The applicable part of parallax barrier pattern 2A is displayed, this is repeated successively, and

it is the 1st to the whole display screen. Stripe image 11A is displayed. It is this The 1st A solid image is observable by observing through parallax barrier pattern 2A.
[0182] It is the 5th as the scans of all finish it as drawing 28. The scanning line Y5 is chosen and it is the 7th [the]. The pixel data of a pixel X7 are a display 1. It is displayed (drawing 28 (A)) and is the space light modulation element 2. The display condition that the parallax barrier pattern is formed (drawing 28 (B)) is shown typically.
[0183] It sets in this operation gestalt and is drawing 28 (B) at this time. It is the space light modulation element 2 so that it may be shown. The 5th It is the 7th on the scanning line Y5. The optical protection-from-light section (close) is indicated by precedence over several pixels (here 8th pixel X8- on the 5th scanning line the 10th pixel 3 of X10 pixel) preceded with a pixel X7. space light modulation element 2 The 5th the 10th of the scanning line Y5 -- pixel X10 up to -- pixel data are displayed as the optical protection-from-light section.
[0184] Thus, they are a stripe image and a parallax barrier pattern corresponding to it 1 The cross talk of a stripe pixel on either side can be further reduced by making several pixels (here, it being 3 pixel) indicate the optical protection-from-light section (close) by precedence over taking a synchronization and indicating by drive for every pixel.
[0185] It is especially the display 1. Space light modulation element 2 When the liquid crystal panel of a different property is used, even if the drive rates of the 1 scanning line of a liquid crystal panel differ, the cross talk of a right-and-left image can be reduced. Conversely, if it says from the point of a drive of a liquid crystal panel, the drive margin for taking the synchronization of each panel and indicating by drive can be enlarged.
[0186] of course, except for this operation gestalt having shown -- 1 Operation gestalt 6 which takes and drives a synchronization for every scanning line etc. -- what is necessary is to be able to apply and just to indicate the protection-from-light section (close) by precedence over the number scanning line in that case
[0187] Drawing 29 is the important section schematic diagram of the operation gestalt 14 of the solid image display device of this invention. Space light modulation element 2 which forms the parallax barrier in an old operation gestalt Display 1 At this operation gestalt, it is the space light modulation element 2 to having constitute so that it might arrange ahead (observer side) and a solid image might be observed. Display 1 It arranges back, the opening pattern which has predetermined light transmission section (opening) and optical protection-from-light section is form, and it is a back light.

[Translation done.]

* NOTICES *

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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The important section schematic diagram of the operation gestalt 1 of the solid image display device of this invention
[Drawing 2] The explanatory view of the solid image display approach of the operation gestalt 1
[Drawing 3] The explanatory view of the drive approach of the operation gestalt 1
[Drawing 4] The explanatory view of the display condition of the operation gestalt 1
[Drawing 5] The important section schematic diagram of the operation gestalt 2 of the solid image display device of this invention
[Drawing 6] The explanatory view about the relation of the polarization shaft orientation of a polarizing plate and the observation image in the operation gestalt 2
[Drawing 7] Other examples of a configuration of the space light modulation element in the operation gestalt 2
[Drawing 8] Other examples of a configuration of the display in the operation gestalt 2
[Drawing 9] The important section schematic diagram of the operation gestalt 3 of the solid image display device of this invention
[Drawing 10] The important section schematic diagram of the operation gestalt 4 of the solid image display device of this invention
[Drawing 11] The explanatory view of migration of opening in the operation gestalt 4
[Drawing 12] The explanatory view which observes the important section schematic-diagram solid image of the operation gestalt 5 of the solid image display device of this invention
[Drawing 13] The important section schematic diagram of the parallax image source of the operation gestalt 5
[Drawing 14] The explanatory view of the original parallax image which the parallax image source of the operation gestalt 5 has
[Drawing 15] The explanatory view of the solid image display approach of the operation gestalt 6 of the solid image display device of this invention
[Drawing 16] The explanatory view of the display condition of the operation gestalt 6
[Drawing 17] The explanatory view of other selections of the display width of face in the operation gestalt 6
[Drawing 18] The explanatory view of the solid image display approach of the operation gestalt 7 of the solid image display device of this invention
[Drawing 19] The explanatory view of the solid image display approach of the operation gestalt 8 of the solid image display device of this invention
[Drawing 20] The explanatory view of the solid image display approach of the operation gestalt 9 of the solid image display device of this invention
[Drawing 21] The important section schematic diagram of the operation gestalt 10 of the solid image display device of this invention
[Drawing 22] The explanatory view of the solid image display approach of the operation gestalt 10
[Drawing 23] The important section schematic diagram of the operation gestalt 11 of the solid image display device of this invention
[Drawing 24] The explanatory view of the display condition of the operation gestalt 11
[Drawing 25] The explanatory view which moves a parallax barrier pattern in the operation gestalt 11 corresponding to migration of a view location
[Drawing 26] The important section schematic diagram of the operation gestalt 12 of the solid image display device of this invention

[Drawing 27] Drawing explaining the display condition of the operation gestalt 12
[Drawing 28] The explanatory view of the display condition of the operation gestalt 13 of the solid image display device of this invention
[Drawing 29] The important section schematic diagram of the operation gestalt 14 of the solid image display device of this invention
[Drawing 30] The perspective view of the operation gestalt 14
[Drawing 31] The important section schematic diagram of the operation gestalt 15 of the solid image display device of this invention
[Drawing 32] The important section schematic diagram of other examples of a configuration of the operation gestalt 15
[Drawing 33] The optical plot plan of the example of a configuration of drawing 32
[Drawing 34] The conventional solid image display device
[Drawing 35] The block diagram of the conventional solid image display device
[Description of Notations]
1 Display
2 Space Light Modulation Element
2A The 1st Parallax barrier pattern (opening pattern)
2B The 2nd Parallax barrier pattern (opening pattern)
3 Image-Processing Means
4 Display Drive Circuit
5 Barrier Drive Circuit
81 6, 6', 6", 82 Y Driver
7 Eight X Driver
9 Observation Condition Input Means
11 Stripe Image (Display Image)
11A, 11B The 1st A stripe image and the 2nd Stripe image
12 Photographic Subject
14 Operation Means of Image Location and Barrier Location
15 Parallax Image Source
16 16' The optical protection-from-light section of a space light modulation element
17, 18, 19 Observation location
20 Display
21 Back Light
22, 24, 26, 26' Polarizing plate
23 25 TN liquid crystal device (TN liquid crystal cell)
30 Observation Condition Detection Means
33 Adjustable Spacer
34 Spacer Driving Means
36 Observer Image Input Means
37 Camera Controller
38 View Location / Direction Detector of Look
41 Solid Image Display Field of Display
42 Solid Image Display Field of Space Light Modulation Element
44 Operation Means of Image Location and Barrier Location
46 Opening Pattern Drive Circuit
45 Barrier Positioning Control Circuit
48 Linear Fresnel Lens
51 51' The light transmission section of a space light modulation element (opening)
52 52' The optical protection-from-light section of a space light modulation element
AR, AL An observer's right eye, left eye
O Both-eyes spacing
C Observation distance
D Spacing of a display and a space light modulation element

B', Bap Width of face of opening formed in the space light modulation element
P, Prea Pixel spacing of a stripe pixel (width of face)
RS and LS The right, parallax image for left eyes
Ri and Li The right, left stripe pixel
KA-KD Camera
A-D Before [camera optical system] side principal plane
Pb Width of face of 1 pixel of a space light modulation element

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[Translation done.]

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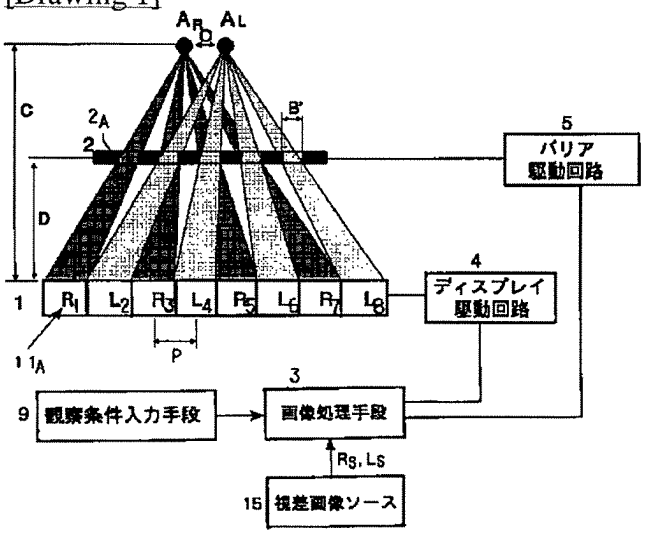
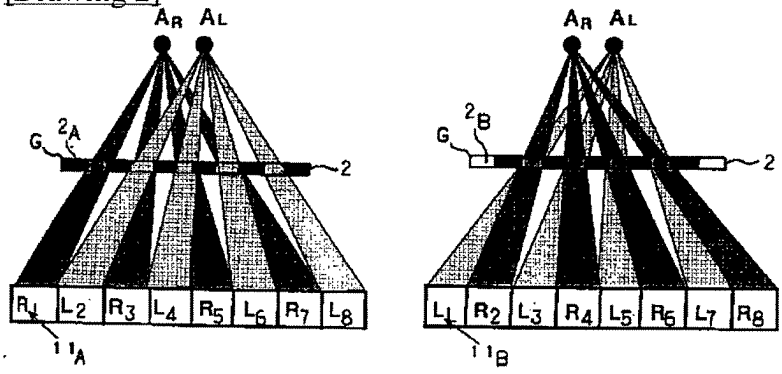
DRAWINGS

[Drawing 1]

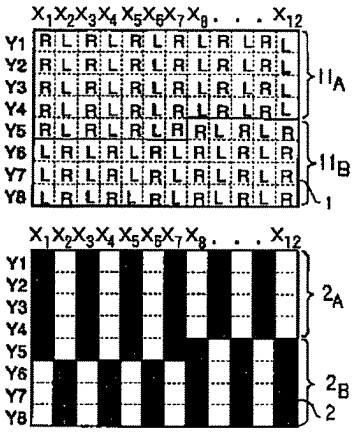


[Drawing 2]

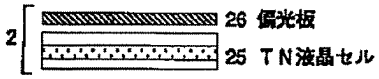


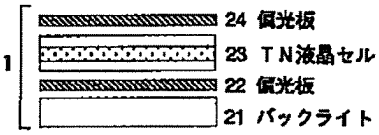
(A) (B)

[Drawing 4]

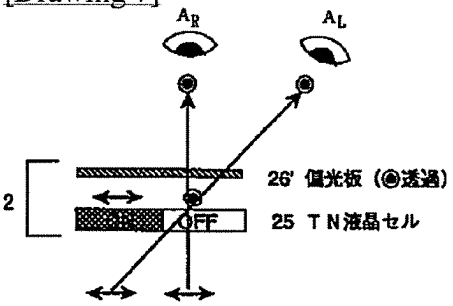


[Drawing 5]

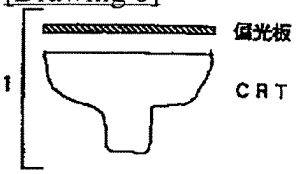




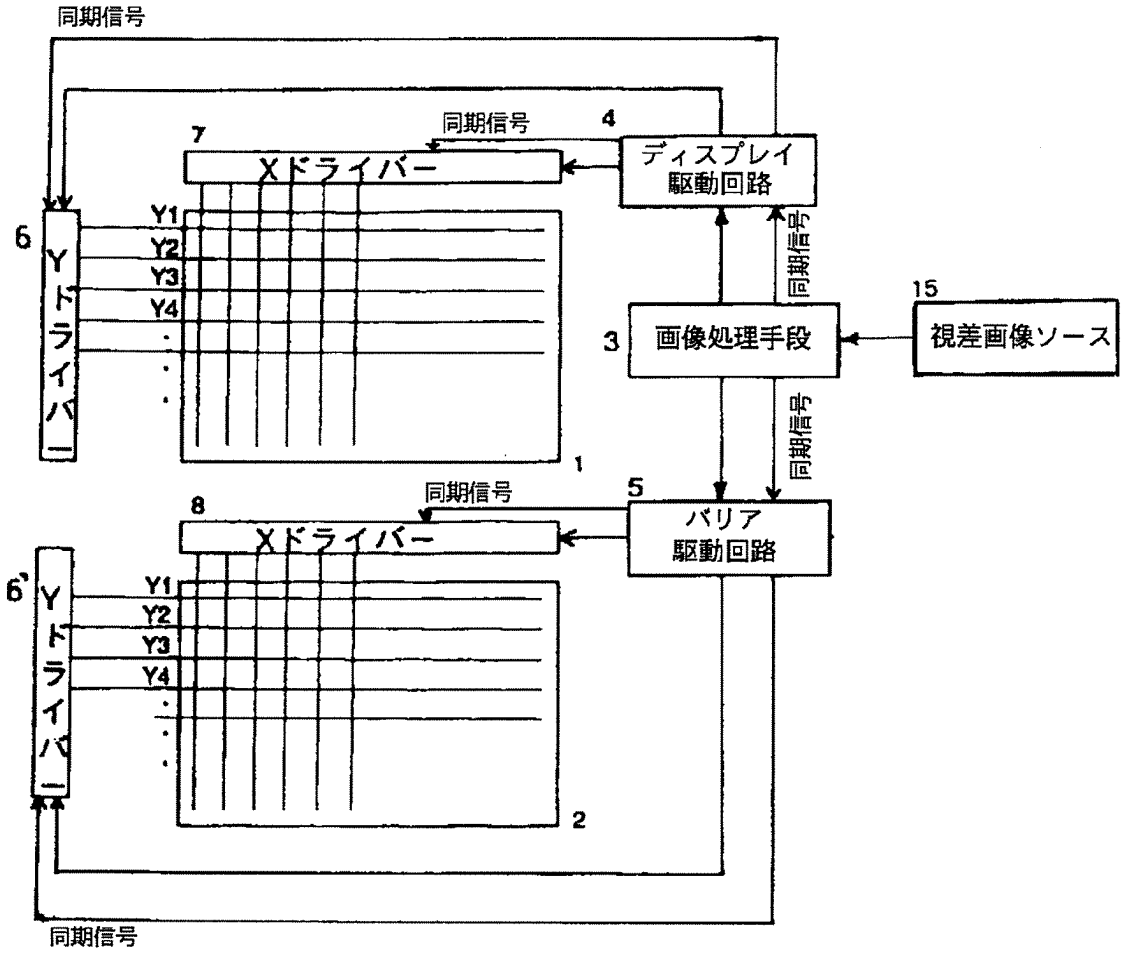
[Drawing 7]



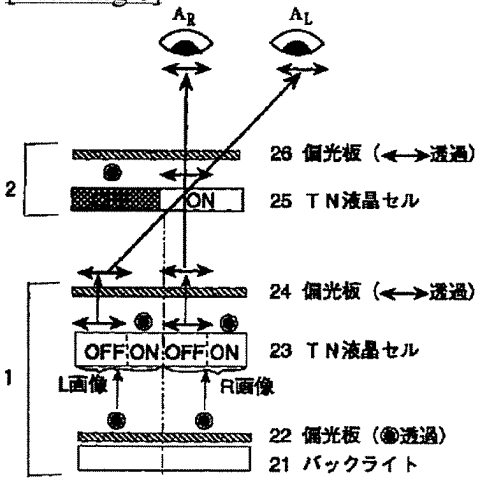
[Drawing 8]



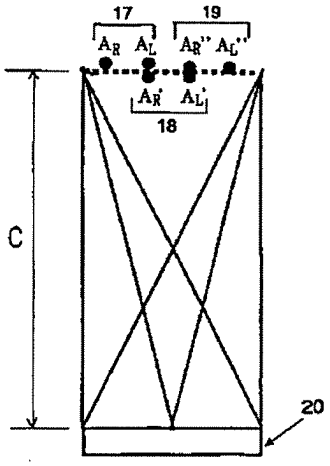
[Drawing 3]



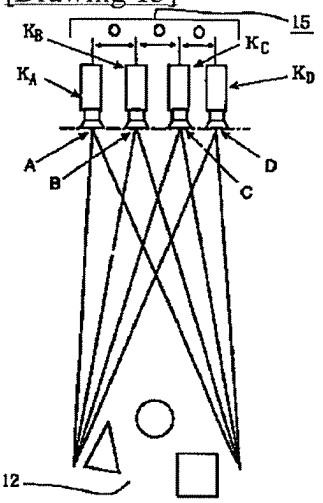
[Drawing 6]



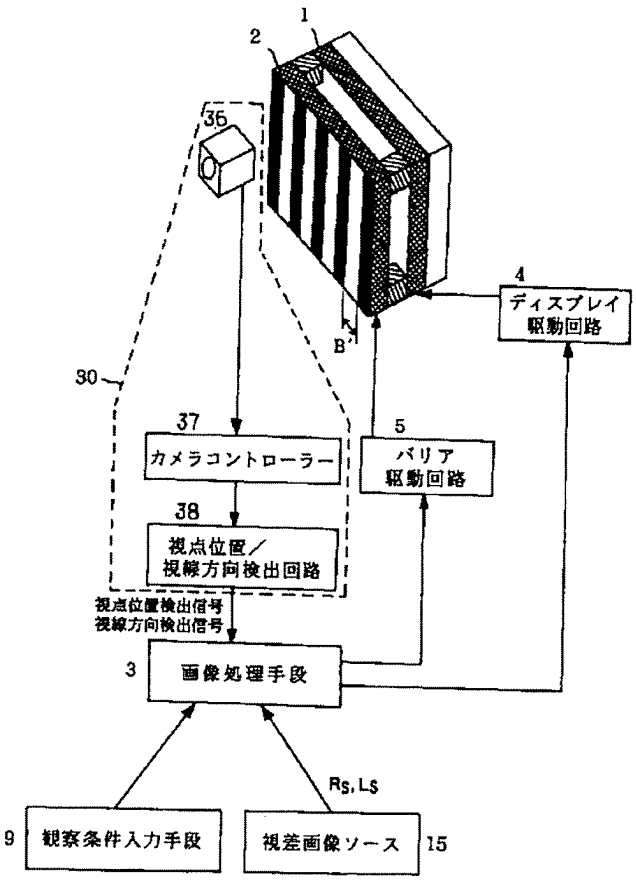
[Drawing 12]



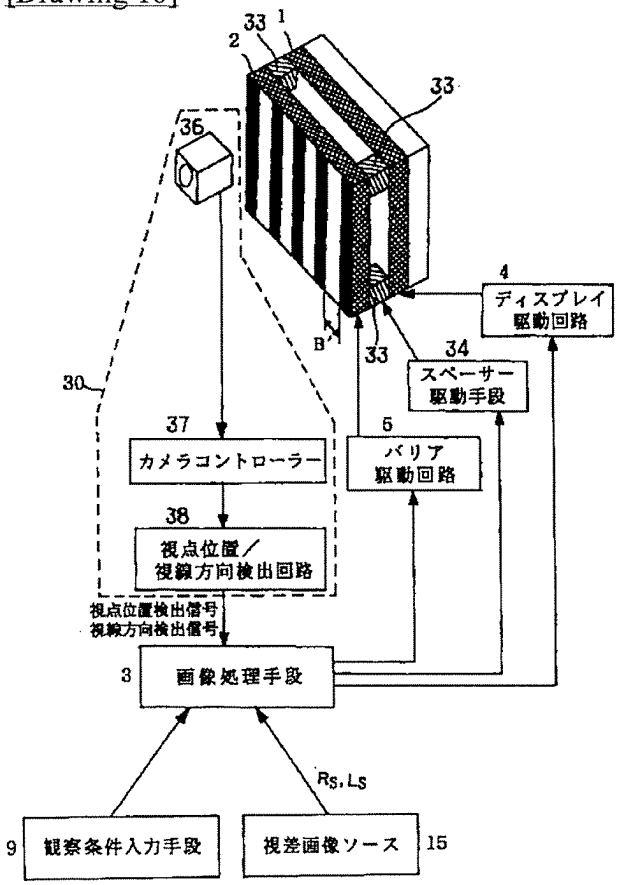
[Drawing 13]



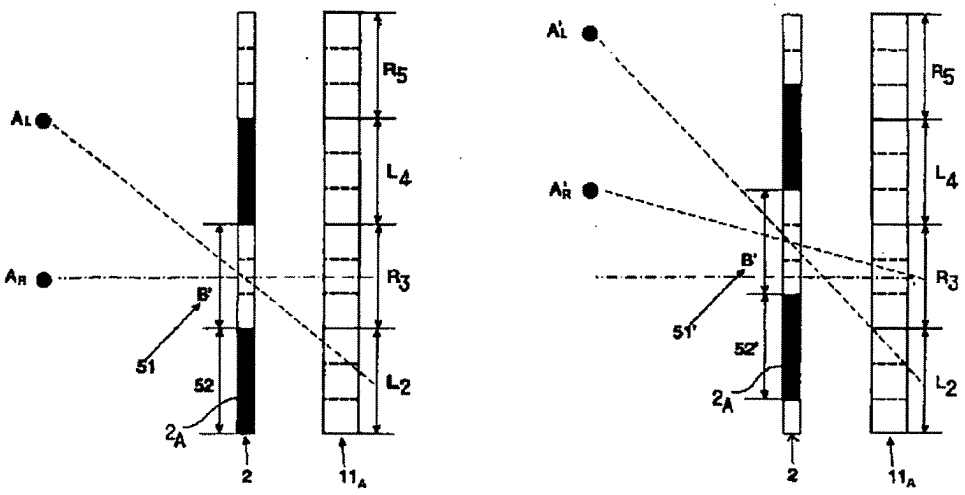
[Drawing 9]



[Drawing 10]

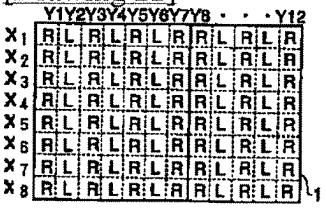


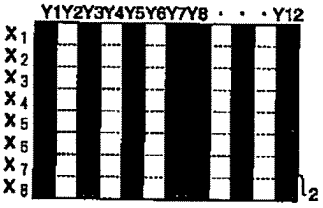
[Drawing 11]



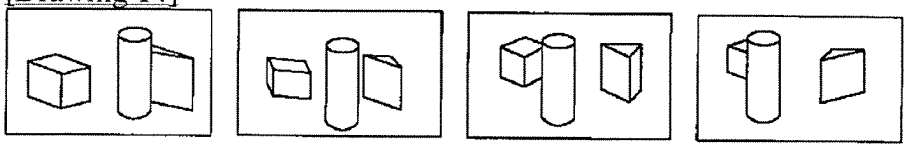
(A) (B)

[Drawing 22]





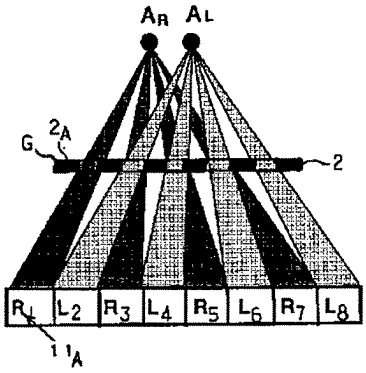
[Drawing 14]



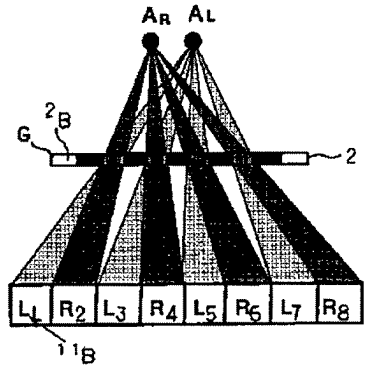
(D) (C) (B) (A)

[Drawing 15]

(A)

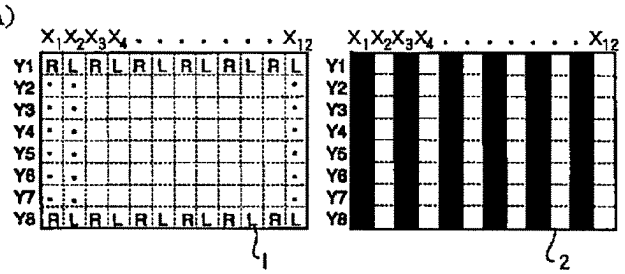


(B)

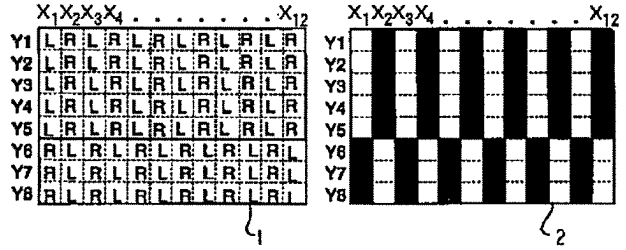


[Drawing 16]

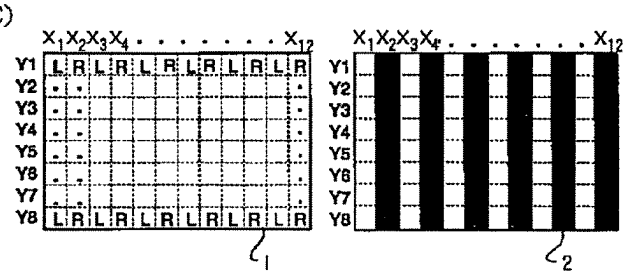
(A)



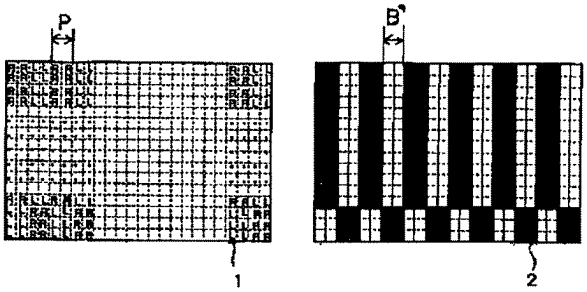
(B)



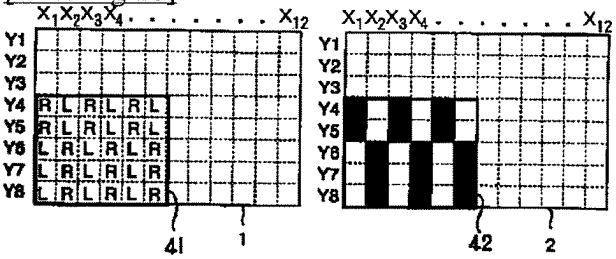
(C)



[Drawing 17]

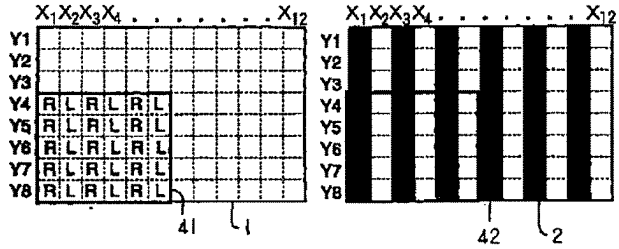


[Drawing 18]

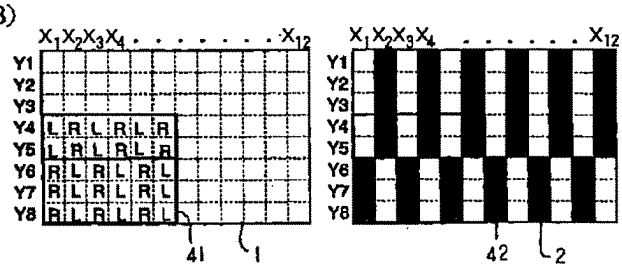


[Drawing 19]

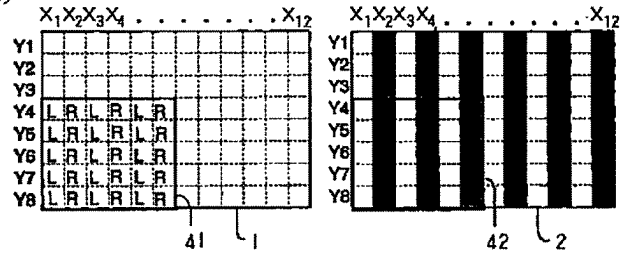
(A)



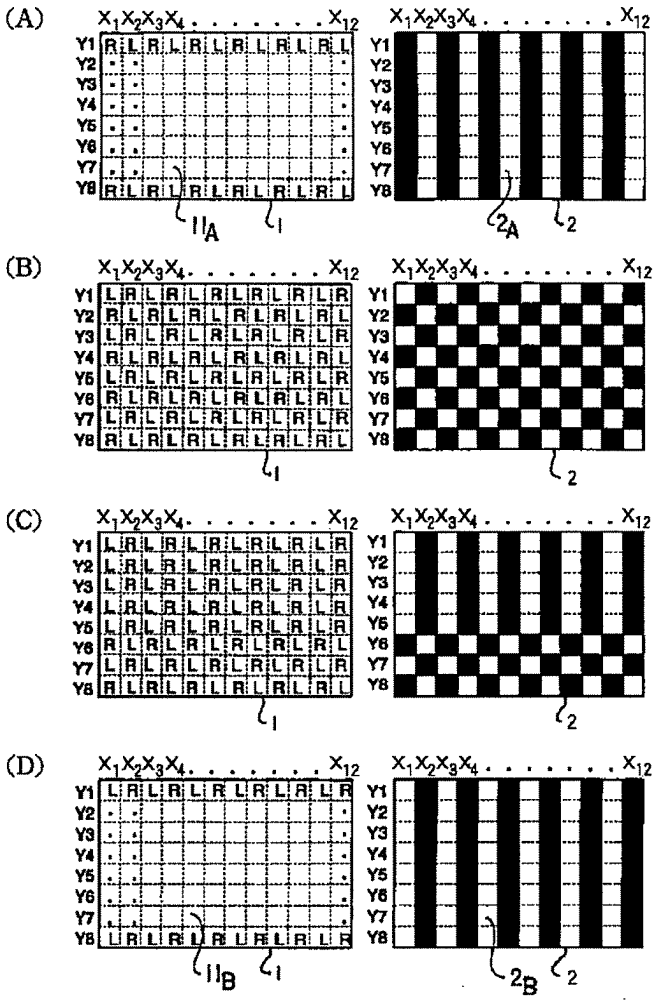
(B)



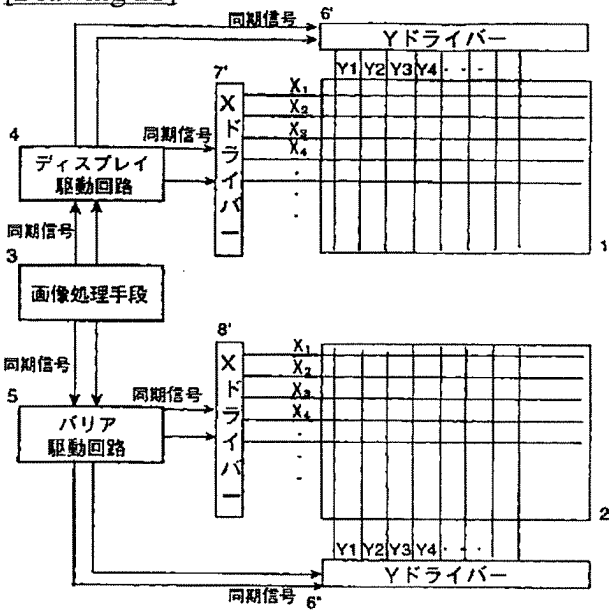
(C)



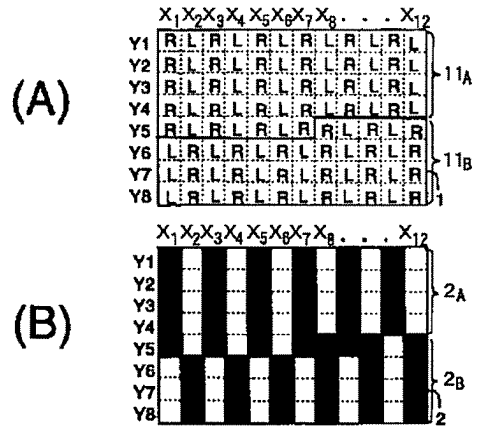
[Drawing 20]



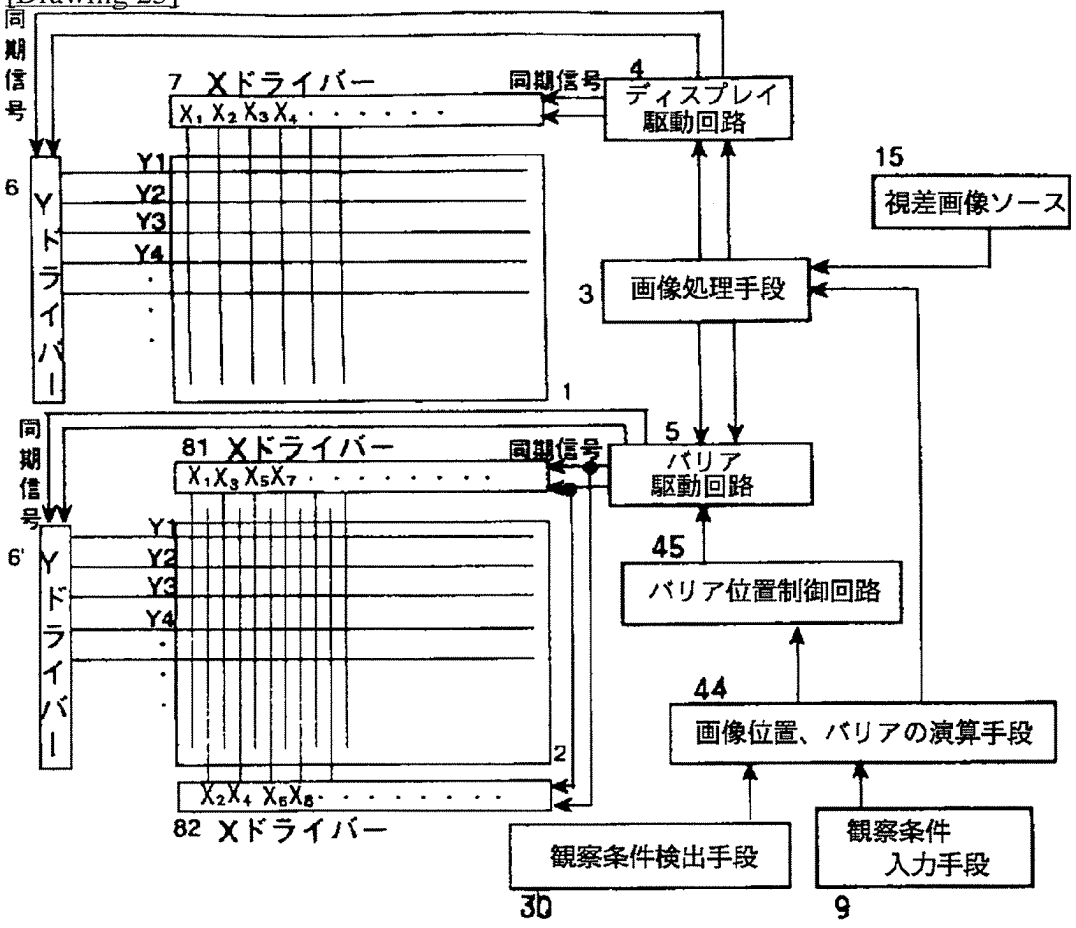
[Drawing 21]



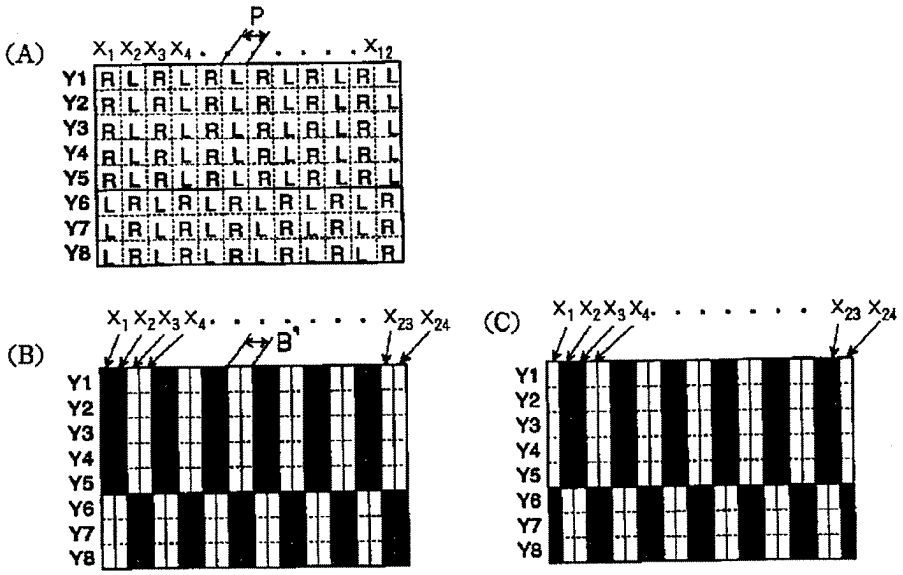
[Drawing 28]



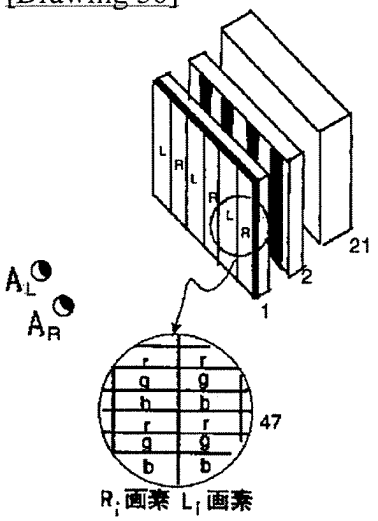
[Drawing 23]



[Drawing 24]

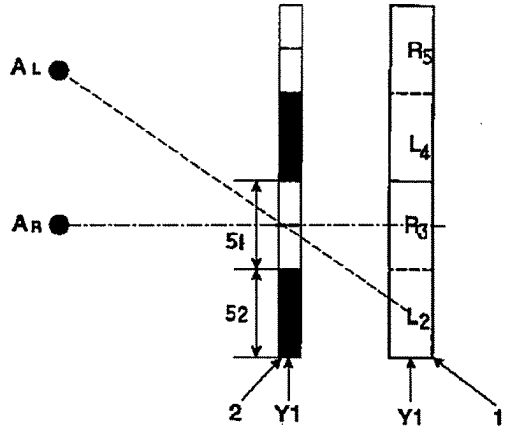


[Drawing 30]

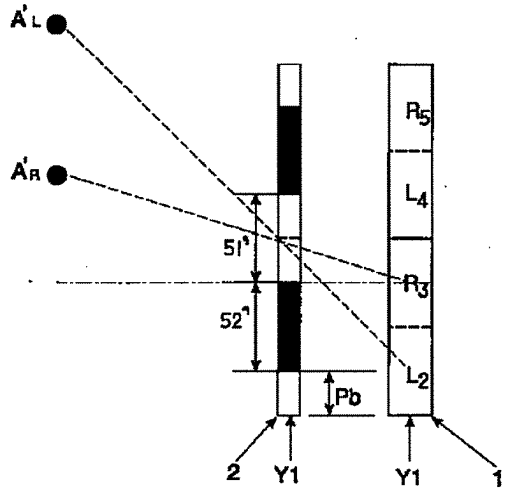


[Drawing 25]

(A)

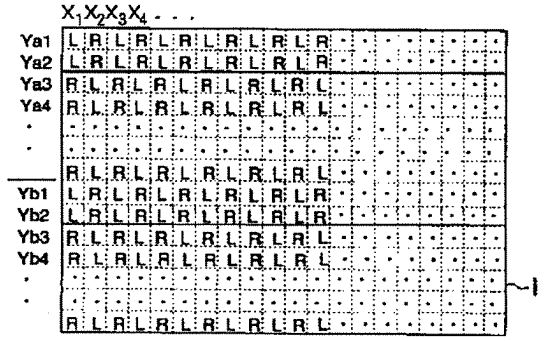


(B)

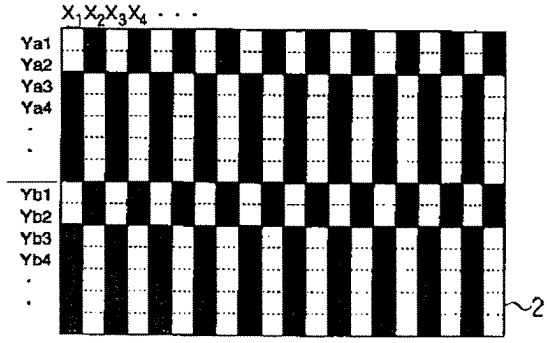


[Drawing 27]

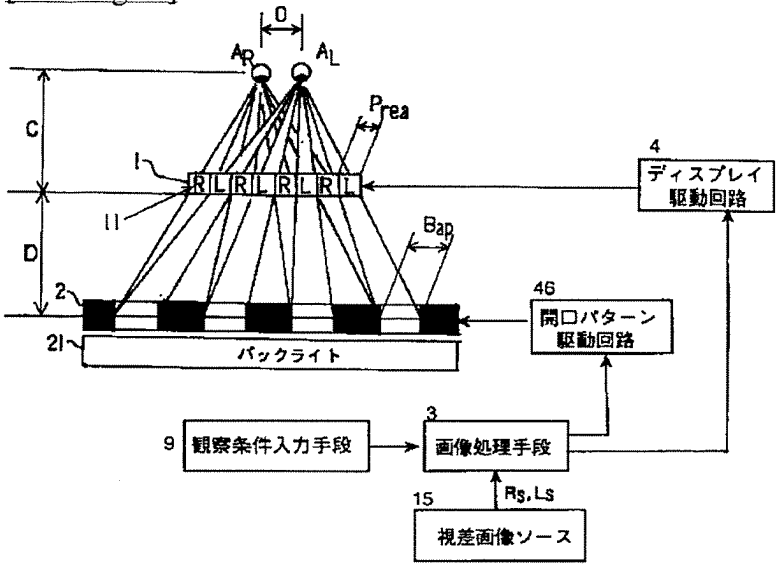
(A)



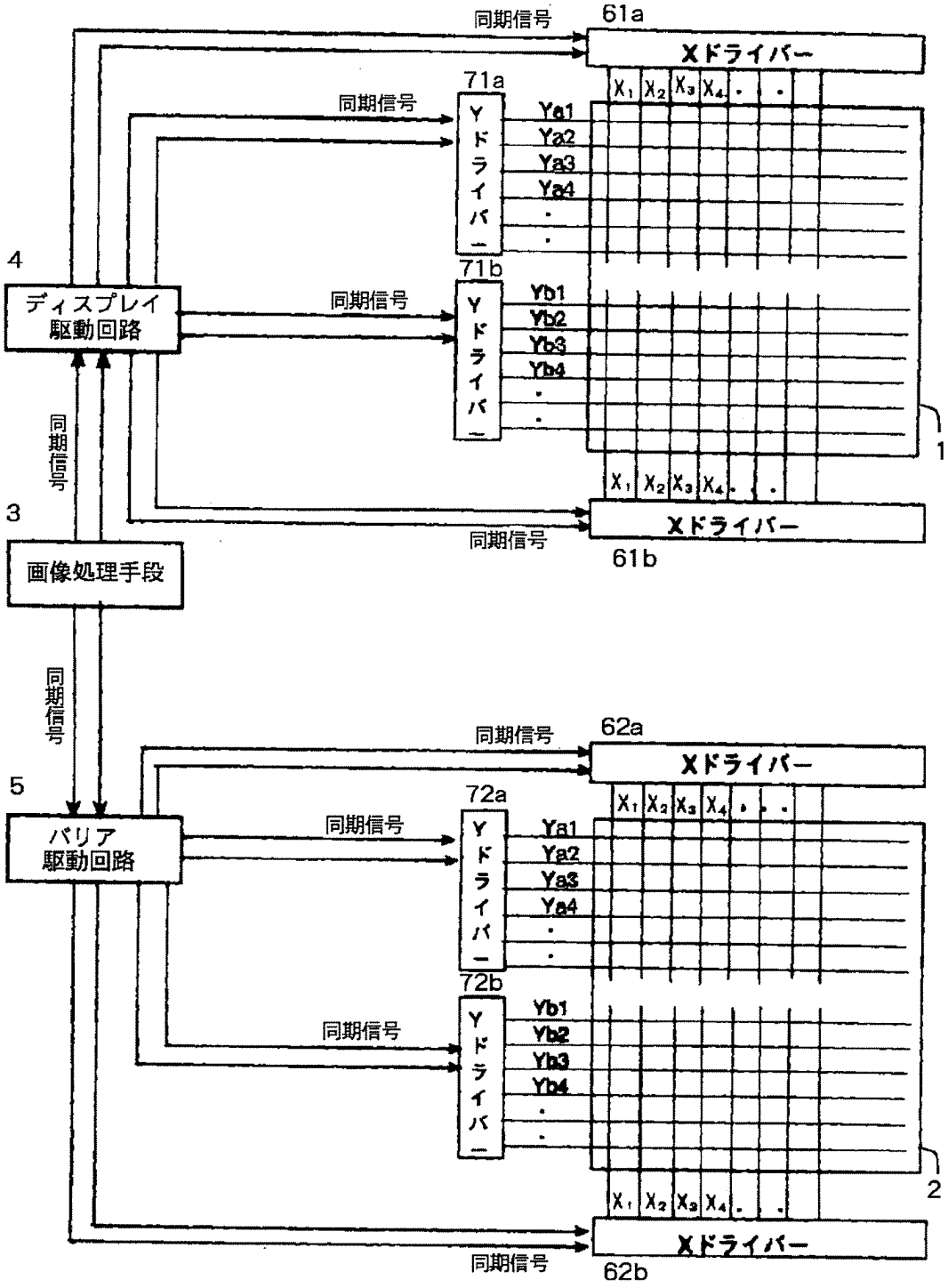
(B)



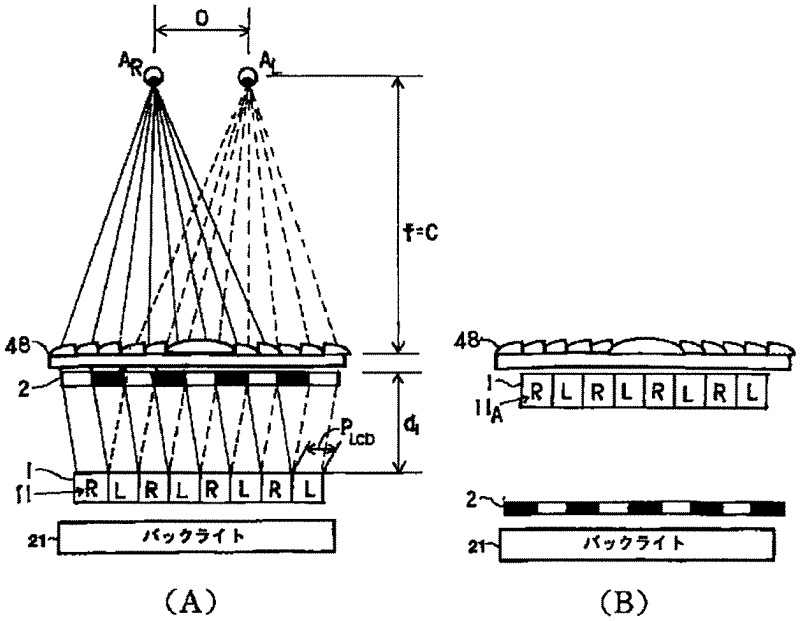
[Drawing 29]



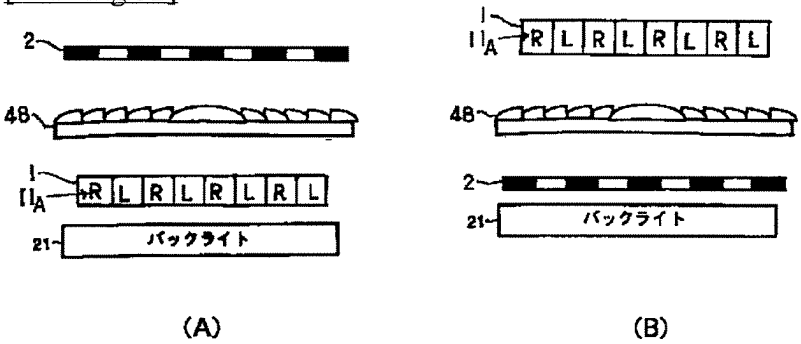
[Drawing 26]


同期信号
61a
Xドライバー
71a
Yドライバー
Ya1
Ya2
Ya3
Ya4
71b
Yb1
Yb2
Yb3
Yb4
4
ディスプレイ駆動回路
3
画像処理手段
61b
1
5
バリア駆動回路
62a
72a
72b
62b
2
X1 X2 X3 X4

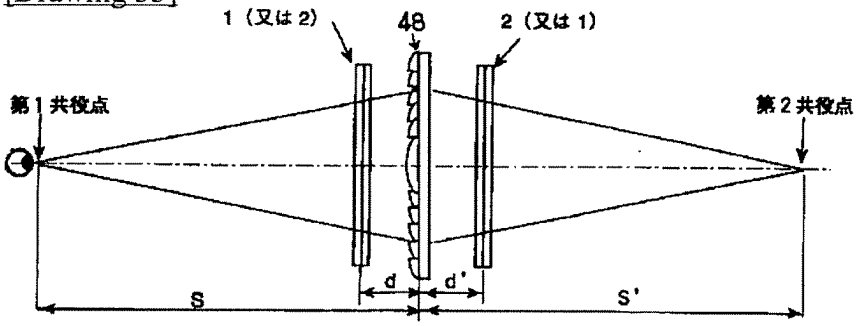
[Drawing 31]



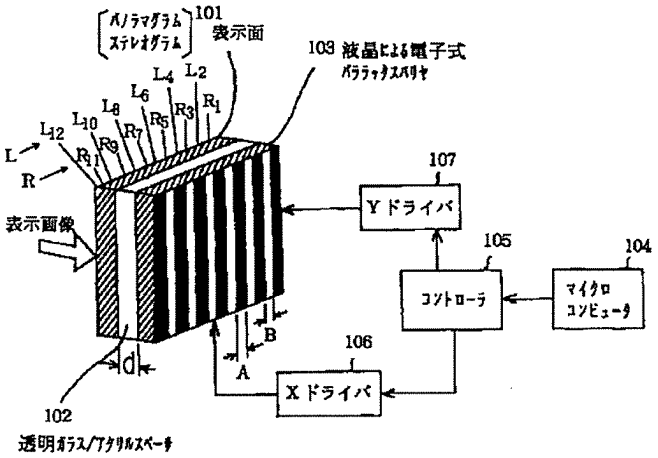
[Drawing 32]



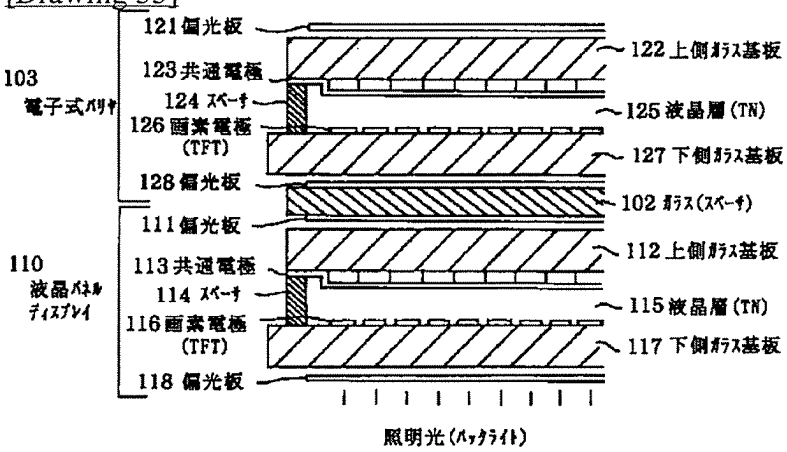
[Drawing 33]



[Drawing 34]



[Drawing 35]



[Translation done.]